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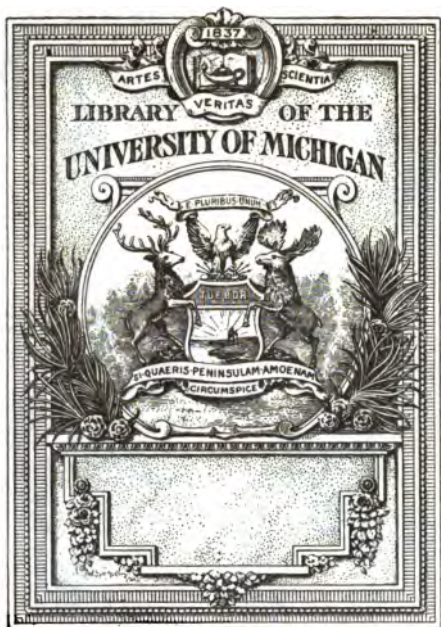
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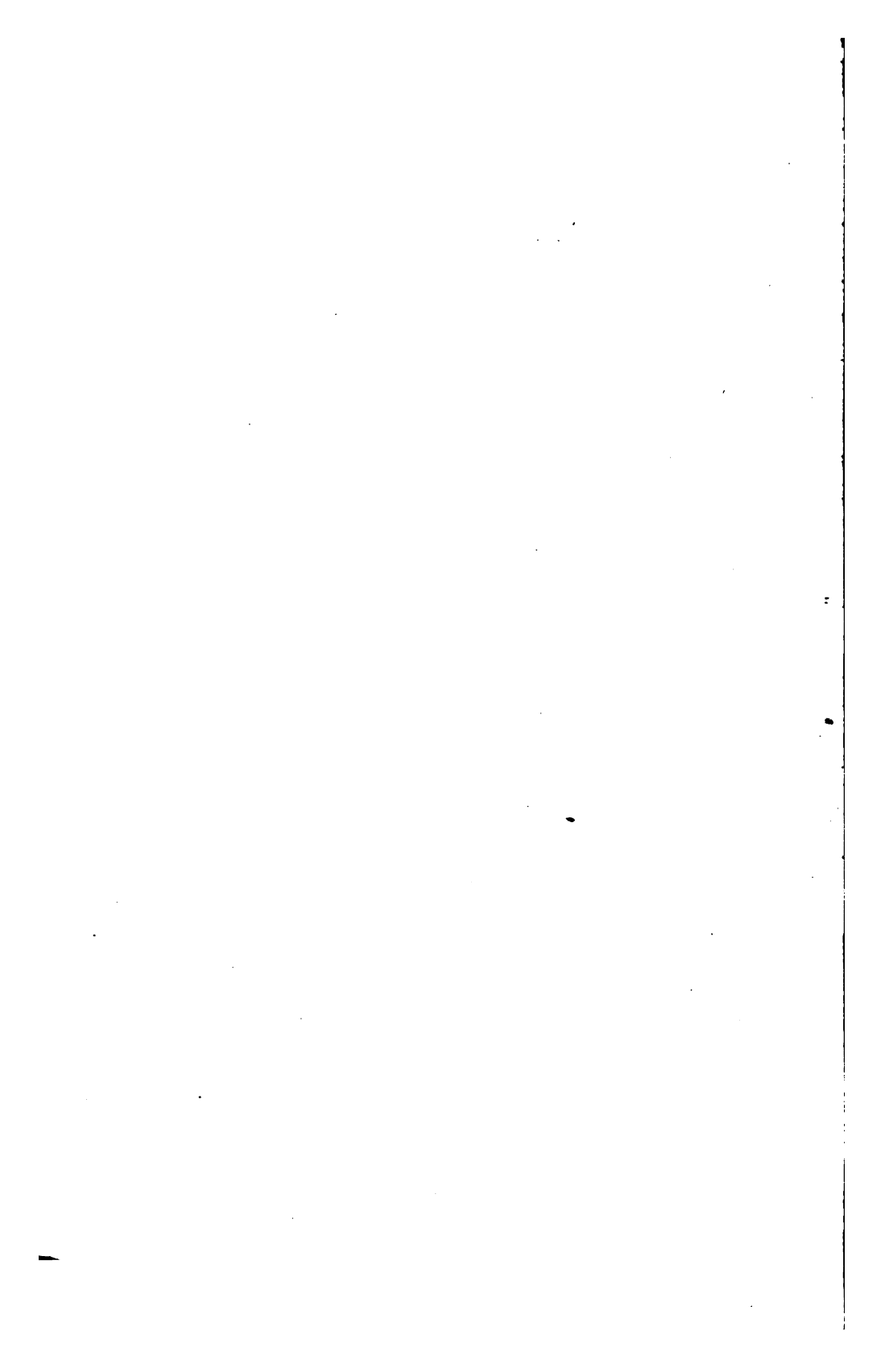
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Modern Business

A SERIES OF EIGHTEEN TEXTS, ESPECIALLY PREPARED
FOR THE ALEXANDER HAMILTON INSTITUTE COURSE IN
ACCOUNTS, FINANCE AND MANAGEMENT

EDITED BY

JOSEPH FRENCH JOHNSON

DEAN, NEW YORK UNIVERSITY SCHOOL OF COMMERCE, ACCOUNTS AND FINANCE

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Auditing and Cost Finding

PART I: AUDITING

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**Modern Business
Volume VII**

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AUDITING

CHAPTER I

GENERAL PRINCIPLES

1. *Definition of auditing.*—In defining auditing it is usual to say that it is derived from the Latin word *audit*, he hears, and that it is the examination of an account by a person appointed to test its accuracy, by comparing each item with vouchers, adding up each page, and at last authoritatively stating the sum owing or owned.

If such a definition is accepted it is likely to lead to serious mischief, because an incomplete audit, like any other half-truth, is liable to be more dangerous than the entire absence of any information. Unless the auditor goes deeper into the accounts that he is examining than merely to test their accuracy and to ascertain whether they are supported by vouchers, his audit, unless we give the words of the definition much greater meaning than they usually convey, will be of so superficial a character that it will be worth little more than the so-called audit of a committee of stockholders, men who have no practical knowledge of accounts.

In addition to the points covered by the definition as given, the auditor should be able to make such an analysis of the accounts and of the business of which they are the history as to present to the proprietor not only a statement of their accuracy, but also an intelligent

idea of the whole trend of the business, to point out weaknesses and to recommend improvements which will add to its efficiency by applying the information obtained from a study of past methods and transactions in the formulating of advice for the future conduct of the business. The study of the history of our own and of other countries will be of little use unless we can gain from it some knowledge of what evil we should avoid and what good we should strive to attain in the future government of the nation. In the same way our study of the accounts, which are the history of a business, should lead us to conclusions which will be of practical value in the future conduct of that business.

Definitions that are based on derivations are apt to be misleading, for words, like children, are apt to deviate from the ways of their parents, and to broaden out as they grow older. Therefore, the auditor is now no longer content to hear only, he must reason about what he hears, and must be able to draw correct conclusions and to state them clearly and forcefully.

2. *The auditor a skilled investigator.*—It is, therefore, apparent that an auditor is more than a critic. He must be a person of original ideas, able to construct anew, when his investigations have caused him to tear down what has been wrongly built. It is intended in these pages to take this view of the auditor's work, and to show not only how he should detect what is wrong, but also how he should institute methods that will prevent the recurrence of the wrong in the future.

It is not, however, intended to imply that an auditor can absolutely prevent wrongdoing or that he can always discover it, if it has taken place. He is not an insurer, nor can he be expected to discover what is not to be found in the accounts, which may have been kept

in so careless a manner that it would be impossible to trace any transaction the details of which had been skillfully concealed, or of which there was no record at all except such as the interested person himself made. For instance a book concern, which did principally a mail order business, made a few cash sales, especially about the beginning of the school year. It was the practice of the man on the floor to hand the cashier, who was also the bookkeeper, the money he received and a scrap of paper with the amount written on it. The bookkeeper was supposed to enter the total of these tickets in his cash sales column at the end of the day. As he destroyed the tickets and as there was no other record, the auditor could only state that there was every reason to believe, from the general recollection of the salesman as to the amount of his average daily sales, that the bookkeeper had largely understated the amount received in the year, but that was only his opinion and not in any sense a proof.

As has been well said, "The opinion is still largely prevalent that an auditor is merely an expert bookkeeper, and that his duties consist mainly of writing up and balancing books of account, and checking the arithmetical accuracy of the figures in statements of earnings or balance sheets, and yet such duties, with the qualifications necessary therefor, form only a small fraction of those required of the successful practicing public accountant. His services are mainly of value in relation to problems involving a thorough knowledge of the principles of commerce, finance and law, and in the application of these principles to any given series of facts disclosed by the examination, not only of the books of account, but of the original transactions which these books should record. In other words, the public

accountant is a skilled investigator who is continually applying his wide training and experience to the ascertainment of facts from any material to which he can obtain access, while the bookkeeper merely ascertains such facts as may be recorded in his books, or records in his books such facts as have been ascertained for him by others."

3. *Training and education of the auditor.*—If this is the correct view to take of the work of the auditor, it is evident that he must in some way make himself acquainted with the underlying principles of accounting; in other words, that he must obtain an accounting education. In the minds of some business men there is a prejudice against those who have received an academic training, on the ground that they are liable to be nothing more than theorists. Such men claim that the only way to educate a business man is by practical experience. This prejudice has been obliged to yield in favor of the university graduate in mechanical and electrical engineering and similar lines, in consequence of the excellent record made by those who have acquired in the universities the theoretical knowledge that has enabled them to do better practical work, because they were doing that work intelligently. The prejudice still lingers in regard to office work in general, and is caused partly by ignorance on the part of employers as to the real work that should be done by their accounting force, and partly from the lack of an adequate idea as to what real education means. If by education we mean the cramming of a pupil's mind with facts or rules without any true conception of their meaning or of the relations in which they stand to each other, it is perfectly safe to say that it is a waste of time.

This kind of an education fits a man for a certain groove in which he moves in a monotonous, routine way, a mere piece of mechanical machinery, incapable of independent thought or action. Any idea of possible improvement in methods is entirely foreign to his mind. If confronted with a new condition to which his rules do not apply, he is helpless and liable to make mistakes that may be disastrous, because his action is based on insufficient knowledge of the foundation principles underlying all work whether mechanical or mental.

True education teaches the pupil to understand these foundation principles and to do his work intelligently, because he knows why he does certain things in a certain way. He is not content with the answer given by a teacher in a so-called business school, when asked the reason for a particular entry on the books; "You must make it that way because that is the right way to make it." The man who handles his accounts or his machinery on this principle will be able to drift along successfully as long as everything is normal, but he is in serious trouble when emergencies arise that require intelligent action.

It is not pretended by the advocates of higher education that a man may attend a technical school, whether of engineering or of business, and by obtaining a certain number of credits, become by that fact alone a competent practical engineer or a thoroughly equipped business man. But it is contended that the graduate of such a school, if he has made fairly good use of his time, will be in a position to make better use of the practical experience that comes to him, than can the man who has no grounding in fundamental scientific prin-

ciples to guide him in understanding the problems that he is called upon to solve; and the facts are all in favor of the truth of the contention.

The analytical faculty is more fully developed in some persons than in others. Some minds seem to be so fashioned that they seize, as by intuition, on the salient points of any subjects presented to them, while others have to reach them by a slow and laborious process of reasoning. There may be some who are so constituted that they can never develop the faculty at all, just as there are said to be those who cannot be taught the simplest principles of arithmetic. It is safe to say that if any of this class exist, they are wasting their time in trying to acquire any real knowledge of accounting principles. The ordinary man, however, can be taught to reason, and by practice can learn to reason quickly and accurately. He can accustom himself to study any given question thoroughly, so as to grasp all its essential features, before he attempts to find its answer and then to cover each point with due reference to each other, so that the result will "true up" to all the conditions.

This power of grasping all the elements of any problem is largely a question of the right use of the imagination, which is only another way of saying that one must have before one's mind a correct image of the whole problem, so that no part will be overlooked while the attention is concentrated on some other part.

Dr. Henry Van Dyke aptly summarized this whole matter when he said, "The chief benefit that a good student may get in a good college is not a definite amount of Greek and Latin, mathematics and chemistry, botany and zoology, history and logic, though this in itself is good. But far better is the power to apprehend and

distinguish, to weigh evidence and interpret facts, to think clearly, to infer carefully and to imagine vividly.”

4. *Auditing is more than bookkeeping.*—Accounting propositions may be divided into two classes, which have been defined as follows:

(1) Bookkeeping, which deals with the correct method of recording any given set of facts, and with the correct mechanical interpretation of the facts which have been so recorded.

(2) Auditing or accounting, which deals with the more difficult and important problem of ascertaining, upon a proper interpretation of legal and other documents, and upon sound commercial or financial principles, the actual facts which have to be or should have been recorded in the books.

Since the auditor must deal with the books kept by the bookkeeper, it follows that he must be himself a good bookkeeper, in order to understand the accounts, while the bookkeeper, however excellent he may be in his limited sphere, may not be an accountant, nor indeed be capable of becoming one.

The successful auditor is not necessarily an expert arithmetician; that is, he does not need to be rapid in addition and other mathematical processes, unless his business is so limited that he expects to do all of it himself. If he is accurate and fairly quick, it is usually sufficient, as he can hire younger men to do the routine work much more cheaply than he can do it himself. Even if he is competent to do this routine work, his time should be too valuable to throw away on it.

CHAPTER II

OBJECTS OF AN AUDIT

5. *Three in number.*—All the authorities agree that the objects of an audit are three in number, the detection of fraud, the verification of the mechanical accuracy of the accounts and the discovery of errors of principle. In view of the great development in recent years of the science of accounting, it would seem as if it were time to add to these time-honored objects a fourth, namely, to ascertain in what ways the accounts can be improved to bring out more clearly the information which they contain, so that it can be used as a guide to future action.

Of these elements of the auditor's work the verification of the mechanical accuracy of the accounts is the least important and requires no more technical knowledge than is possessed by any fairly good bookkeeper. It may be said to be incidentally essential, as the statements on which the auditor's conclusions are based must necessarily be correct to start with. As a rule, fraud will imply errors in principle and in mechanical accuracy, since it can be covered up only by violating the laws of accountancy in both these respects.

The word "fraud" as here used covers not only cases of actual defalcation and embezzlement, but also the inaccurate statements that may be made of the conditions of a business by a person who possibly may not be intending to deceive, but whose desire to make a good showing may cause him to view the situation in a more

hopeful light than would an absolutely disinterested person, or who may be so ignorant of the true principles of accounting as to ignore items of liability that should be included in the balance sheet.

In the detection of fraud we have to be on our guard against every variety of manipulation of the accounts, but there is one peculiarity about almost all fraudulent sets of books. Whatever the method adopted to conceal one wrong entry, it is almost sure to be the same in regard to all others. This arises from two causes, a desire to simplify the work of keeping up the defalcation and a fear of trying a new method of concealing it when one has already proved so far successful. The history of all such cases is liable to be about the same. A temporary need arises for money, either on account of losses in gambling or speculation, or from some unusually insistent creditor who threatens to make trouble if his bill is not paid. The young man borrows the money from the cash drawer with the firm intention of replacing it when his luck turns or he has been able to save the amount from his salary. In order to carry it temporarily he makes a false entry to conceal it and finding that this is not discovered it is easy for him to repeat the operation every time he needs, or thinks he needs, more money, becoming more desperate with each increase of the amount, plunging deeper and deeper into gambling or speculation in hopes of making sufficient winnings to cover the whole shortage, until the amount becomes so large that even the most careless employer is sure to suspect something and begin an investigation. This is the history of nearly all cases that are discovered. It sometimes happens that the man becomes frightened after the first few steps have been taken, makes extraordinary efforts and repays the

money. How many such cases there may be there is no way to ascertain. The accountant naturally knows more about the ones where the money is irretrievably lost, but it is safe to say where the money is lost in gambling or speculation it is never replaced permanently.

The gradual nature of the progress of fraudulent entries, the insidious character of the temptation to which even the most honest is subjected is a strong argument in favor of the periodic audit. No man knows to what extent he can resist temptation when perhaps some emergency such as long-continued sickness in his family develops a desperate need for ready money. The best safeguard that a naturally honest but weak man can have is the knowledge that in a few weeks his work will be scrutinized by some one who will be sure to notice any irregularity.

6. *Detection of fraud.*—In an investigation for fraud where it is as yet only suspected, but not discovered, the auditor must study the whole system of accounts in order to locate the weak spots, trying to see where he could take advantage of them if he were in the book-keeper's place and wished to avail himself of any opportunity to abstract money with the least chance of discovery. It is only in the crudest cases that the shortage is apparently covered by forcing the addition of the cash book. This is too dangerous, for someone might take a notion to go over the addition and discover the fraud. To aid in locating the more ingenious frauds we must study the various accounts in order to see whether there is not some one that is abnormally large or small, for as we have said the fraud is usually confined to one line. For instance, in a savings bank that had twenty ledgers of five hundred pages each, the aver-

age of the total balances per ledger was about \$75,000.00, but the twelfth ledger had less than \$40,000.00. Of course this might have been correct, but it was sufficiently strange that nineteen books should be so nearly alike, while one was so far away from the normal, as to put the examining accountant on notice, as the lawyers say, with the result that he discovered a defalcation of about \$30,000.00. This case also illustrates a peculiarity of the ordinary defaulter, the leaving behind him of traces that can easily be followed when his system is once grasped. As usual the accounts were known by numbers. In looking over the teller's blotter, the accountant noticed that certain numbers were underlined, then that they were always one of two numbers constantly repeated and that the drafts that were supposed to have been made against these two accounts were always for round amounts from one hundred to one thousand dollars. Turning up the pages corresponding to these numbers he found them blank as to the underscored items. Adding up the underscored items as far as he found them to extend, he found that they made up the amount necessary to balance the ledger. The defaulter had confined his wrong entries to one ledger instead of scattering them among them all, where they would be less likely to be noticed, and had marked every fraudulent entry in a distinctive way. His doing so arose from a wish to keep the whole thing in as compact shape as possible, so that he could keep track of it himself.

When the auditor finds peculiar conditions such as these, his first thought must be; why are they here? It may be that there is a legitimate reason for their existence and he must not be content until he has analyzed the whole situation and satisfied himself as to their

correctness. The most suspicious entries may be susceptible of completely satisfactory explanation. An accountant, not of the highest rank, was once engaged in ascertaining whether the stock of a certain company had been fully paid up out of accumulated profits, as the books seemed to show. He found one entry crediting profit and loss and charging plant and machinery with a very considerable sum. It looked like a purely forced entry, and as the manager was a friend of his, he refused to go on with the investigation, as he did not wish to make a report reflecting on the honesty of the transaction. Other accountants were sent for, who became equally suspicious of this particular entry, but they went more thoroughly into the affair and discovered a number of items charged to expense and subsequently to profit and loss that were legitimately plant and machinery. The final inventory of the plant and machinery showed that this amount was necessary to bring the account up to the actual value on hand and that the entry was correct if the inventory was. As the inventory was undisputed, the accountants reported that the profit and loss account was correct and that the capital had been legitimately paid up out of profits actually earned. The first accountant had not gone deep enough to get below the surface and ascertain the why of the entry in question.

7. *Errors in mechanical accuracy.*—While errors in mechanical accuracy are frequently caused by the existence of fraud, they are not necessarily a sign of anything worse than carelessness or incompetency, and sometimes of too hurried work, in consequence of the fact that the bookkeeper has too much to do.

The fact that the books are in balance is no certain sign that they are correct, although that is often used

by employers as a reason for not having an audit made. Every bookkeeper of any experience has known cases where the trial balance was apparently correct, and yet where there were counter errors that had neutralized each other.

When there is a very small error in a trial balance it is often the practice to write it off as too insignificant to bother with, and this is often advised by the head of the office. But unless every item has been carefully checked back at least twice, it is dangerous to do this, besides being very unbusinesslike. It is not uncommon to have an error of a few cents develop into errors of hundreds of dollars before the thorough checking is finished.

The surest way of discovering an error in a trial balance is by the method of abstracting the accounts. But since there may be too many accounts to be verified to allow of each one being treated separately, the ledger may be divided into blocks of fifty, one hundred or two hundred pages each, according to circumstances, provided the bookkeeper is accurate in putting in his posting folio numbers. With a columnar sheet before you, post from the books of original entry to the respective columns by blocks, keeping the postings from each book separate from the others. In this way the footings of the books of original entry are proved by adding the totals of the items posted from each book and comparing with the totals of that book, and the balances of each block are proved by starting with the original net balance of the block, adding or deducting the debits and credits for that block and comparing with the net total of the balances at the end of the month or other period under review. Each block that proves out is eliminated, and only the part of the work need be checked that is

comprised in the block in which a discrepancy is discovered. When the bookkeeper has already checked back his work twice without locating his error, it is almost useless to check it over again, for the error, under such circumstances, is usually one that will be repeated over and over again. The independent posting is a slower process but it is absolutely certain to locate the error in the end. Many bookkeepers adopt the plan of posting to such an analytical sheet for all their work, so as to have a test ready-made for the trial balance when it is taken off, claiming that the ease with which an error is found more than compensates for the trouble of the double posting during the month. This is called "reverse posting," as the process consists of posting first to the ledger and then back again to the sheet.

Occasionally the professional accountant is asked to undertake the finding of honest errors in the mechanical work caused by carelessness or incompetency, but he always avoids such employment if he can, because it is purely mechanical in its nature and he realizes that his client cannot afford to pay professional fees for a service of this character, unless the case is exceptional, or there is reason to fear that the errors are not as honest as they seem.

As a rule, the auditor requires that the books be brought into balance before he enters upon his duties. This is especially true when the audit is periodical and for a fixed fee, as it is not fair to ask him to trace and correct errors of the bookkeeper. If he good-naturedly does it for a few times he is apt to find that the bookkeeper will develop a habit of leaving the errors without looking for them, as the auditor will be sure to find them anyway.

8. *Errors in principle.*—It is when the auditor dis-

covers errors in the principle that his best work is called for and his greatest troubles begin. They very frequently arise from honest ignorance, but are also frequently caused by the desire to make as good a showing as possible in the operation of the business. In either case it is a difficult thing to show the office manager that his course is a wrong one. If the error arises from an honest lack of knowledge it is usually accompanied by a total incapacity to understand the true principle involved. If the cause is a desire to swell the apparent profits the auditor is handicapped by the unwillingness of the manager to give up the practice, as his doing so may materially reduce the showing of the current year when compared with previous ones in which the error existed. And yet it is very important, in fact imperative, that correct ideas should be held in all matters affecting the calculation of the profits. Failure properly to discriminate between apparent and real profits has often led men to take steps that have eventually brought disaster.

It is well to understand thoroughly that any statement of the profits of a business is only an estimate until the business has been wound up. This arises from the fact that the profits depend on the value of the assets as shown in the balance sheet, which value may not be eventually realized. Any reduction in it would have to be provided for out of profits, which would be reduced to that extent. It is, therefore, extremely important that the greatest care be exercised in scrutinizing all asset accounts with a view to determining whether they are carried on the books at a figure which they can reasonably be considered worth.

There are many ways of reaching an erroneous result in calculating the profits of any given period, some

of which are almost too false on their face to deserve mention, but others have an insidious character that is very apt to deceive, owing largely to the different methods of figuring on the cost of goods. As the inventory is the basis of all profit figuring it is there that we are most apt to find errors that may lead to false results. Closely allied to these errors is that of calculating on profits before they are realized, even to the extent of paying dividends that exist only on paper. A similar error may arise from the method of treating losses from bad debts. It is a very common thing to find these charged to a suspense account which is still carried on the balance sheet as an asset and therefore is included in the profits. Many a business man prides himself on his conservatism in promptly charging past due accounts to suspense and it is very difficult sometimes to show him that he has changed only the name of the account and has not in any way altered its nature as an asset, unless he has at the same time opened a contingent reserve account on the other side of the ledger.

It is proposed to treat of these and other errors as they are reached in discussing the different phases of accounting involved in the conduct of an audit.

CHAPTER III

AUDITING SINGLE ENTRY ACCOUNTS

9. *Vouchers and invoices all-important.*—A single-entry set of accounts is one in which only one entry is made for any transaction and is really not entitled to be called a set of accounts at all. No attempt is made to reach a balance in anything but the cash-book, no accounts being kept with any assets or liabilities except memorandum accounts with debtors and creditors. For this reason it is usually said that it concerns itself only with the personal accounts. It is not necessary to keep a regular ledger account even with these. If a duplicate invoice is made for each sale, all the invoices can be filed alphabetically. When one is paid it is marked with the date of payment and transferred to a paid file. Those remaining in the unpaid file would represent the accounts receivable just as truly as if they were entered in a ledger. A similar treatment of invoices received from creditors would take care of the accounts payable. The cash-book is a mere record of receipts and disbursements, no distinction being made in regard to their character. The purchase of a boiler, which is an asset, is treated in the same way as the purchase of coal, which is an expense. A certain amount of cash is accounted for in either case, and that is as far as the accounts go. Naturally it is difficult to make an audit of such accounts further than to see that a proper voucher is on hand for each item of the disbursements. If a proper invoice is made for each

sale, and approved by the shipping clerk, it is also possible to check up the cash sale and accounts receivable entries to see that all the goods that have left the house have been accounted for.

A statement of the net profit of the business for a given year may be made by ascertaining the net worth at the beginning of the year, that is, the total assets on hand, including customers' accounts, less the total of the amounts due to creditors. The difference between this net worth and that at the end of the year, made up in a similar manner, would be the profit or loss of the year, if the proprietor had not drawn out any money during the year. If he has, the amount of such drawings must be first deducted from the net worth in the beginning, the supposition being that he has used part of his original capital and allowed the profits of the year to accumulate. Of course, it will amount to the same thing if his drawings are added to the net difference, the supposition then being that he has drawn out profits as they accrued from time to time.

When the auditor has prepared such a statement of profits and a corresponding table of assets and liabilities, he has done all that he can do, in showing the total net profits and present net worth. But he has no way to show how the profits were made, nor can he make any comparative tables showing the different elements of cost and gross profits in two or more consecutive years so as to account for any increase or decrease in the net results.

It is true that an auditor can prepare a proper set of accounts from single-entry books by going over them in detail and posting the various items to the correct accounts on his own sheets. If he does this, he can draw off a trial balance at the end of the year, and pre-

pare a proper balance sheet, neither of which is possible from the accounts as they originally stood. But the auditor, in doing this, has rewritten the books in double entry and has entirely destroyed all the single-entry characteristics, and it is incorrect to say that he has made a trial balance of the single-entry books.

10. *Single entry useful in some kinds of business.*— While such a system of accounts would not serve the purposes of any business which is at all of a complicated nature, it is a mistake to say that it can never be useful. A small retail dealer who does business almost, if not entirely, for cash, can just as readily obtain all the information he needs in this way, as he could if he kept an elaborate double-entry set of books. This is equally true of those whose transactions are limited to the realization of definite assets and the liquidation of definite liabilities, such as would be the case with executors and receivers, unless their duties are complicated by the necessity of continuing the business of a testator or an insolvent. All that it is necessary for them to do is to prepare a proper inventory for the court showing the assets in their possession and the claims that have been filed against them. A cash account showing in detail how they have collected the assets and have distributed the proceeds among heirs or creditors can easily be checked against the original inventory. If the auditor does this, he can prove the accuracy of the accounts just as well as if a complete double-entry set of books had been kept. He must, of course, be careful to see that any interest, dividends or rents that should have been received are duly accounted for.

A produce commission merchant can use equally simple methods. All he needs is a book ruled with columns for the name and address of the shipper, de-

scription of the goods received, the party to whom sold, the price realized, the commission charged, the net amount remitted and the number of the check sent. As he remits at the close of each day, the transactions are all expressed by the cash received and paid. If he handles articles that are not quickly perishable and that can be carried over the day of receipt, he would naturally find the purely cash, single-entry system inadequate.

In the same way a renting agent can keep the simplest kind of accounts, as he needs only to have a rent-roll of the tenants and a cash-book to record his receipts and disbursements. The rent-roll is a mere memorandum register to show which tenants have paid. The statement to the owner consists only of a list of the rents received, with the expenses paid out on account of the property, and if a copy is kept, it is a sufficient record since each owner's account is supposed to be closed by a check to balance with each statement.

It must not be understood that this simple way of keeping the above classes of accounts is always to be recommended. In fact it is usually better to open a regular double-entry set of books. The idea sought to be conveyed is that they may be kept in this way and that the form of statement necessary may be made up from schedules and the single-entry set of books just as well as from a set that is more elaborate in method.

11. *Objection to single entry.*—The great objection to this system, if it can be dignified with the name of system, is that there is no way to prove the accuracy of the accounts, except by going over all the work again. Since no item balances against any other, there is no possibility of taking off a trial balance. An error, intentional or otherwise, will not be discovered except by

accident or after a systematic search, so that the opportunity is great for serious discrepancies, as in the case of the old-fashioned merchant who was surprised at the good results of his year's business and had spent a considerable sum in unwonted extravagance before he discovered that he had added up the year of our Lord among his assets.

CHAPTER IV

DOUBLE ENTRY

12. *A complex business demands double entry.*— As a business becomes complex and advances from conditions that are based almost entirely on the movements of the cash to those in which time becomes an element, or in which it is necessary to take cognizance of the varied sources of profit and loss, it is found that the single-entry method is inadequate. The element of time appears when goods are no longer bought and sold for cash, but on the basis of payment in the future, when recourse must be had to open accounts receivable or payable. This is still more important when long-time bonds are issued. It now becomes necessary to know how much is owing to, or by the business at any time, and to be sure that the figures are reliable.

The necessity for knowing the sources of the profit or loss appears when the processes of the business are complicated by division into departments, whether these are only the prime divisions into manufacturing, selling and administrative, or whether these are again subdivided to cover different classes of goods handled or different plants, perhaps widely separated. In such a business it is absolutely necessary that accurate statistics be kept in order that reliable information may be available as to the cost of the different processes either in a general way, or by a more or less elaborate cost system, so that by comparison between different plants or the same plant at different periods, leaks may be

located or economies introduced that will tend to the increase of net profits, which are the end and aim of all commercial transactions.

Not only must this information be obtainable, it must also be in a shape that will admit of proof of its accuracy, by the assembling of the figures in such form as will prove that no error has been made in their preparation. This can be done only by a system of double entry, which, as we shall see, demands an equivalent credit for every debit, and vice versa. As each entry balances against some other entry, the total of all the entries must also balance, that is, the net debits and credits of all the accounts; in other words, the balances on the ledger must themselves be in balance. This is shown by the assembling of all the balances in a table called a trial balance, in which the total of the debit balances exactly equals the total of the credit balances, thus proving the accuracy of all of them.

13. *Foundation of double entry.*—Therefore, it may be said that double entry provides for the keeping of an account with every element of the business; not only the personal accounts, but also the impersonal, such as merchandise, the various expense accounts and profit and loss.

The foundation of the double-entry system is that every debit is offset by an equivalent credit, and every credit by an equivalent debit; in other words, that every entry is absolutely and without exception a journal entry.

A great many rules have been formulated for journal entries, such as:

Debit whatever comes into the business or costs the business value; credit whatever goes out of the business or produces value for it.

Or this:

<i>Credit</i>	<i>Debit</i>
Decrease of assets,	Increase of assets,
Increase of liability,	Decrease of liability,
Increase of proprietorship.	Decrease of proprietorship.

Or:

Debit the account that receives the benefit, and credit the account that yields the benefit.

These rules are perfectly correct from an academic standpoint, but the difficulty is to remember the rule and to classify the entry to fit it.

It is claimed by some that an easier way to make an entry clear is to personify all the accounts, by saying that Mr. Merchandise is the person to whom is committed the custody of the goods in which we deal, and Mr. Cash the person to whom we pay or from whom we receive the cash that is involved in our transactions. This becomes a little too complicated for most persons when an attempt is made to explain some of the more intricate entries, especially in closing the books.

These and many other examples that might be given of the attempts to explain debit and credit, show to what length the authorities are driven in order to form a working hypothesis which will cover all the points of the subject.

14. *Debit and credit.*—The difficulty seems to be that they all start with a wrong idea of the fundamental principles. Thomas Jones, one of the first writers on the subject, said:

All debits are not sums owing to us, nor are all credits sums we owe. These terms are used arbitrarily, and any attempt to exhibit them in one uniform relation of indebtedness must necessarily oblige us either to use terms of corresponding ambiguity, or resort to the personification of things which not only have no

existence, but the indebtedness of which cannot possibly have any apparent influence on the end we aim to accomplish. In personal accounts they bear a literal meaning; and by analogy they have been extended to all other accounts; but the relations which constitute that analogy are too obscure to be of use as a guide to the student, and are more calculated to mystify than explain the subject.

Again, Charles E. Sprague says that bookkeepers call "all credit balances, liabilities, although they know that some of those balances are not liabilities. Even admitting that there is fictitious entity, it owes nothing to the real owners." He gives as the basis for determining whether an item is a debit or a credit six classifications, debit expressing an increase of assets, a decrease of liabilities or a decrease of proprietorship, and credit the three opposites of these.

It would seem as if these more or less elaborate attempts to define and explain debit and credit would be unnecessary, if we could find some method "to exhibit them in one uniform relation of indebtedness" which, as we have seen, Mr. Jones says cannot be done. In other words, if we can show that a debit is always something due to, and a credit always something due from the business, the problem will be greatly simplified.

To do this it is absolutely necessary to discriminate between the business and the proprietor who owns it. In speaking of this view of the matter Mr. Sprague says: "I cannot see that it justifies the inclusion of proprietorship among the liabilities. Surely the business does not stand in the same relationship to its proprietors or its capitalists as to its 'other' liabilities."

15. *Relation of business to proprietor.*—What then is the relation of the business to the proprietor? If A invests a certain sum of money in a business to be

managed by B under the name of B & Company, the distinction between A, the proprietor, and B & Company, the business, is plain. A would charge B & Company on his books, and it would be hard to make him understand that B & Company did not owe him the money represented by that debit balance. It is true that the account would not "stand in the same relationship" as other accounts that are of short duration, but that would not change its character as a debt. But if it is a debt on A's books, what magic is there in the word "capital" that changes its nature on the books of B & Company, except to classify it as the last debt to be paid, which is a difference in degree but not in kind. If this is agreed to, it seems equally true that when A invests money in the business of A & Company which he manages himself, he is acting in a dual capacity, as A, the capitalist, and A & Company, the business. If the latter business goes into the hands of a receiver, all that is left when the "other" liabilities are paid would certainly constitute a debt of the receiver to A and would be so treated and paid. The fact that A does not get any payment until every other claim is satisfied does not alter his status any more than the status of second mortgage bondholders as creditors is altered by the fact that there may be only a partial payment to them possible after the first mortgage bonds are paid.

If the capital is acknowledged to be a debt of the business, our next concern would be with the nominal accounts, such as rent, wages and expense. That these are debts due to the business by the proprietor arises from the fact that the business is managed for account of the proprietor, who must eventually pay all its outgo and receive all its income. When the manager has expended various sums for rent, wages, etc., he is entitled

to present a bill to the proprietor as an indebtedness of the latter to the business. The proprietor, while acknowledging the indebtedness, tells the manager that, since the actual money is not needed, he can charge the items to his account, but for statistical reasons to do so, not in one general account, but in different ones, such as "proprietor for rent," "proprietor for wages" and so on. The manager, for the sake of brevity, drops the name of the proprietor and keeps the accounts as rent, wages, etc. When the gross profits are ascertained at the close of the fiscal period they unquestionably belong to, and are owed to, the proprietor. The profit and loss statement is simply the statement of the proprietor's account with the business in which, as in every other personal account, the debits and credits are offset, and only the balance is accounted for. That this balance is really a debt due by the business to the proprietor is shown by the fact that the latter can demand every cent of it in cash. That he allows it to be added to his original credit in a personal business, or in the case of a corporation allows it to be credited to a new proprietorship account called surplus, does not in any way alter its character as a debt of the business to him.

In the personal accounts, any item for which payment can be demanded from any person is a debit, any item for which payment can be demanded by any person is a credit. In the impersonal, or nominal accounts any item payment for which can be eventually demanded from the proprietor is a debit and any item for which the proprietor can demand payment is a credit. No other touchstone seems to be needed to determine the true nature of any item.

The most severe test of this method of treating this matter would probably be formulated in explaining the

asset accounts, and yet it is reasonable to say that if the business invests money in a building, in machinery or in material for the account of the proprietor, the latter must owe the business for these things. If a reserve is set up for depreciation on building or machinery it must be a credit, for it is a payment due the proprietor for the use of the building or machinery, representing the loss of value to him consequent on such use.

In the same way any item may be satisfactorily explained if its real nature is ascertained. It does not seem an unreasonable thing to recommend the adoption of a theory which can be applied to every phase of a subject and fits them all.

16. *Every double entry a journal entry.*—The statement has been made that every entry in a double-entry set of books was a journal entry without exception. This is a fundamental rule and if it is thoroughly grasped, and lived up to, there will never be any danger of error. To understand it, it is necessary to trace the development of bookkeeping methods from the very beginning of the double-entry system.

At first the journal was, what its name implies, a day-book. Each transaction was separately detailed in it, in journal form. Each receipt of cash was represented by an entry of "Cash to A B," "Cash to C D," and so on, and each item of cash was posted separately to the ledger account. In the same way every item of outgo was debited and cash credited.

The first step in advance was the assembling of similar items each day so as to make one credit or debit entry on one side and sundries on the other, such as "cash to sundries," to show the total receipts of cash each day. The next step was the assembling of these similar items by devoting one or more pages of the journal to each,

and changing the posting of the single term of the entry from a daily to a monthly one. The next step was an obvious one. Instead of devoting several pages of the journal to cash entries a separate journal was employed for that purpose, and since all the items in this book involved cash, it was no longer necessary to adhere to the strict journal form. For a long time, however, it survived in the habit of beginning every entry on the left hand page with "To" and every one on the right hand page with "By." It is understood that a journal entry can be made either in the ordinary form of "Cash dr. to Sundries cr.," or as "Cash cr. by Sundries dr." This explains why credits to accounts in a cash-book are at the left and debits at the right, for if the whole entry were made, the left hand page would be "Cash to Sundries," in which cash would be in the left hand column and sundries in the right hand one. While we are posting from the left side of the cash-book to the right side of the ledger, we are really posting from the right hand column of the page, the left hand column being eliminated as useless. The journal entry is completed at the end of the month by posting the total of the left hand page to the debit of the cash account on the ledger. The same principles apply to the other side of the cash-book.

The next step was probably the elimination from the journal of the sales by the adoption of the sales book, the true journal nature of which would be at once recognized if the proper heading were placed at the beginning of each month of "Sundry Customers To Sales." If the purchase record were headed "Sundry Accounts Payable by" the names of the accounts shown in the distributive columns, the journal feature would again be apparent, as it would in all the subsidiary

books, however complicated they might at first appear.

17. *Journalizing all entries.*—It is customary in some houses to bring all the business of the month into the journal by summaries, and to post everything that belongs in the general ledger from the journal entries. There does not seem to be any good reason for this, if the subsidiary books are kept in any reasonably proper manner. For instance, if the purchase record is kept on the plan of crediting each creditor with the goods bought from him, such credits are posted directly from the record, and there does not seem to be any reason why the offsetting debits in the distributive columns should not be posted directly from the same book to the respective accounts in the general ledger. This is especially true of the practice of journalizing the cash which a number of bookkeepers follow. To copy all these entries in the journal necessitates duplicating the work, and where a journal voucher is used, triplicating it, without any apparent advantage and with the risk of error in copying it. To say that it is well to assemble all the transactions in the journal is to lose sight of the fact that the cash-book, and all other books of original entry, are themselves journals, and that all of them together are one journal, bound in separate covers merely as a matter of convenience, and with the journal idea somewhat obscure to the superficial observer on account of the suppression in most of them of one or the other half of the journal entry in its distinctive form, though it appears in reality when the totals are posted to the ledger.

CHAPTER V

METHODS OF AN AUDIT

18. *The cash.*—Having acquainted ourselves with the general characteristics of the subject with which we are to deal, we can proceed at once to the consideration of the methods to be adopted in carrying out the details of an audit.

As an audit consists of the verification of the accounts as they are, or as they should be on the books, at the time when the audit is made, we naturally start with the item which varies the most from time to time, that is, the cash. The first thing for the auditor to do, is to verify the cash on hand in the drawer or safe, unless the office is sufficiently systematized to have adopted the method of depositing all receipts in bank every day and of paying everything by check. If he finds checks in the cash he should note whether they are current or old ones that have either been thrown out of bank, marked "not sufficient funds" or have been cashed for some officer, employé or friend and held as an accommodation. If the checks are all current he should examine the cash-book to see whether the parties from whom they were received have been given credit for the proper amounts. If not, the checks must be doing duty for entries to which they are not applicable and there is a corresponding shortage in the cash.

If the proper system of handling the incoming cash, and the petty cash is followed, it will be sufficient at first to verify only the petty cash and afterwards to

reconcile the bank account, for which purpose it is better to have the pass-book balanced specially and delivered directly to the auditor by the bank. This is not imperative when the last bank statement shows no signs of having been altered or manipulated in any way.

A proper system of handling the cash requires that all the mail shall be opened by someone other than the cashier. This person should be provided with an ordinary one-column blotter in which all remittances received are entered with at least the initials of the remitters. The letters and enclosures are then passed on to the cashier and bookkeeper. If there are any cash sales made they should be recorded on a duplicate register, the key of which is held by the person keeping the blotter of receipts. When the deposit is ready for the bank, this person ascertains the amount of cash shown by the register, enters it on the blotter, compares the total of that book with the deposit slip, initials the slip, and again compares the entry in the pass-book when it returns from the bank. This is the most effective way of preventing the carrying over of a shortage by holding out money one day and replacing it out of the receipts of the next, which is one of the most difficult things to detect when no such precaution is taken. This method will prevent it absolutely, unless there is collusion between the cashier and the keeper of the blotter. Collusion of this kind is very rare, so rare that it is almost entirely a negligible item. The auditor has done his duty if he has provided a system which can fail only through such collusion.

19. *Precautions for guarding cash.*—It is sometimes recommended that the cashier be required to take an impression copy of his deposit ticket before going to bank, but a little reflection will show that this precau-

tion is valueless since there is nothing to prove that the ticket copied is the one actually used in making the deposit. In cases where holding over or "lapping" is practiced, the cashier deposits a check received from A, and does not credit A on the cash-book, but abstracts an equal amount of currency for his own use. The next day he enters A's credit on the cash-book, but neglects to enter anything to the credit of B, whose check is used in the deposit to offset A's credit. Since the two checks are seldom of exactly the same amount a scrutiny of the deposit ticket that is actually used in the bank would disclose the discrepancy. But if the cashier makes up a deposit ticket that exactly corresponds with the items on his cash-book for the day and copies it in his impression book, it is an easy thing to make another ticket for the bank which contains the actual items that he deposits, the total being made to agree with that of the copied ticket by the addition or subtraction of the small amount of currency necessary to create the equilibrium.

Dicksee recommends the use of counterfoil receipt blanks consecutively numbered, which, however, he says are not an infallible preventive of fraud, though he does not say why. If the counterfoil consists merely of an ordinary stub, it is manifest that there would be no way to insure that the record on it was in any way descriptive of the receipt. It differs from the stub of a check-book, since the checks are eventually returned and can be compared with their respective stubs, while the receipt would never be returned except in the rare case of a disputed payment.

If the counterfoil takes the form of a carbon copy, it is equally capable of manipulation. It is only necessary to place a card under the receipt when it is origi-

nally written so that no mark will be made on the duplicate, and then to place over the carbon a piece of blank paper on which an entirely different receipt may be written, to obtain a "carbon copy" which is absolutely unlike the original.

Not only must auditors be constantly on their guard against being deceived by too blind a reliance on what looks at first sight to be an infallible safeguard, but office managers should realize the folly of depending too implicitly on precautions that are by no means perfect, especially since the existence of the precaution may give them such a false sense of security that they may neglect to exercise ordinary vigilance in the supervision of the cashier's accounts.

20. *A plan for the record of incoming funds.*—This method of making a record of incoming funds may be made to save a large amount of clerical work in an office of considerable size. The manager's stenographer may be furnished with blanks in triplicate, ruled with columns for names, addresses, description of funds (local checks, New York drafts, money orders, etc.), actual amount of remittance, cash discount, freight deducted, allowance claimed and any others called for by the business. As the manager opens the letters he may pass over to the stenographer those which contain remittances, together with the enclosed funds. The stenographer then enters the items on the blanks with the typewriter, gives the original with the letters to the bookkeeper and the duplicate with the funds to the cashier or treasurer, and retains the triplicate. The bookkeeper posts directly from his copy and when he has verified all the entries, compares the total with the treasurer, who then enters the total in his cash-book as one item. The blanks must be so made as to be capable

of being filed in binders by each one of the three and carefully preserved, as they are in reality books of original entry, portions of the cash-book.

In any well-regulated office it is essential that all the receipts shall be deposited in bank, so that the debit side of the cash-book shall exactly equal in amount the entries on the bank pass-book. This can be shown on the cash-book by having a special column for the bank deposits, which will equal the sum of all the other receipt columns, or by having the first column contain the net cash representing each receipt, proving the equality with the bank book by adding them both up to date. It is better to deposit each day's full receipts as a total, but if not advisable or possible in cases where mails received after banking hours contain considerable remittances, a mark on the cash-book should show the point down to which the items had all been deposited. If items are entered on the cash-book on the last day of the month after the deposit has been made those items should be made up in a specific deposit the next morning and the pass-book should then be left to be balanced before another deposit is made. The reason for this is obvious. The movement of the cash is identified with the bank account each day, making it possible for the auditor to verify it by comparison with the bank statement, or with the pass-book, if the statement method is not used by the bank. In order to make a thorough test of the identity of the items purporting to have been deposited, the auditor should obtain from the bank copies of the actual deposits made on days selected at random, and should compare the items with the entries on the cash-book.

21. *Disbursements of cash.*—As all the receipts are thus required to be deposited in bank it is necessary to

so arrange matters that all payments shall be made by check and that every check shall be shown on the cash-book. This is an easy matter with all the larger disbursements. To cover the smaller ones, a petty cash fund should be created by drawing a check to the order of the cashier for a round amount, determined by the needs of the business, and charging it on the ledger to petty cash account. When this check is cashed the money is kept entirely separate and a petty cash-book opened containing columns for carfare, telegrams, express and other items that it may be thought best to classify. All cash payments are made out of this fund and no payments are made out of money that is received for cash sales or other receipts, except that checks may be cashed out of such funds, and deposited in lieu of the cash they replace. When the petty cash fund is nearly exhausted the cashier makes a regular bill or voucher against the house, the same as if he were an outsider, containing as items the totals of the various columns of his petty cash-book. This is presented to the officer or partner who draws checks, together with the petty cash-book and any vouchers that there may be. This party issues a check to the cashier for the exact amount of the bill and also initials the book. When this check is cashed by the cashier the fund is restored to its original size and the process is ready to be repeated. At all times the cashier must have in his petty cash box and in his book the items which together will represent the total amount of the fund. The disbursements represented by the check are entered on the main cash-book in the same manner as those represented by any other voucher. This is called the "Imprest System." This is a far better method than returning to the main "cash"

the unexpended money at the end of the month, or than keeping a running account with "petty cash."

In cases which sometimes occur where checks are given in exchange for currency or drafts, the check should be entered in its regular order on the disbursement side of the cash-book and the currency or draft on the other side, and both items marked "contra" in the folio column, showing that they are offsets and are not posted to any account. In this way the check is accounted for and the currency or draft is included in the deposit. Nothing is so perplexing to the auditor as to find checks issued and paid, for which no entry appears on the cash-book and the only explanation for which is a note on the stub that it is issued against currency furnished by so-and-so, or in exchange for a New York draft from such and such a customer.

In the case of checks cashed out of the receipt funds no entry is necessary, as the checks take the place of the currency in the deposit and there is no more disturbance of the routine than occurs when small bills are given in exchange for a larger one. If the check cashed is one issued by the house itself it should be deposited just the same as any other. When it is an outside check, it is well to make a note on the stub of the check book of the name of the person for whom it was cashed together with the amount and the bank on which it is drawn, so that it may be traced if it should be lost.

22. *Due-bills in the cash.*—When the cash is not kept in this way the nominal amount in the office is sometimes found to be very large. In such cases it is often discovered that it consists very largely of due-bills and other cash memoranda. The auditor should list these and in his report should specify the amounts and the

names of the parties for whom they are carried. If the latter are officers or employees it should also be noted in the report whether the due-bills are covered by salaries earned but not yet due, or whether they are advances on salaries yet to be earned. The practice of carrying due-bills in the cash is a vicious one and should always be condemned by the auditor, even where it is indulged in by the head of the office, or rather all the more when such is the case, for when persons in authority commit irregularities the whole office force is apt to be demoralized.

It is sometimes customary to carry small unadjusted items in the cash until their disposition can be determined. It is such a desirable thing to have a perfectly clean cash record that it is certainly worth the little trouble that would be caused by charging such items to a temporary suspense account and thus keeping them out of the cash drawer.

23. *The bank account.*—If all the receipts of cash are deposited in bank, in the manner already indicated, there is a sufficient internal check on the accuracy of the bank account. If this is not done, however, the requirements of an audit are not all met by ascertaining that the present balance in bank corresponds with that called for by the cash-book, due allowance being made for the outstanding checks and other items that enter into the reconciliation table. The bank account may be exactly right at the beginning of the year and again correct at the end and yet may not have been correctly stated on any other day of the year. Money may have been abstracted and used for nearly the whole time and replaced temporarily in anticipation of an audit. Items left for collection may have been paid and no entry made for them on the books, or any one of several systems of kiting may have been indulged in on the last day of the

year to cover a shortage that may have existed for a long time. It is imperative, therefore, that sufficient tests of the accuracy of the bank account at different periods during the year should be made by the auditor to satisfy himself that there has been no manipulation of it.

If debit and credit columns are carried on the cash-book in which the deposits and checks are recorded, the stubs of the check-book may be dispensed with, if so desired. Care must be exercised to insure the proper recording of a check on the cash-book before it is allowed to go out of the office, unless, as is sometimes the case, a carbon copy of the check is retained. The difference between the two bank columns will, of course, show the balance in bank.

24. *Reconciliation of bank account.*—The auditor should make a reconciliation of the bank account and keep a copy of it among his papers. In all audits except the first he should work from his previous reconciliation table, checking the items in it that have since been taken up, and carrying forward those which have not been. The ordinary form of a reconciliation statement starts with the balance as shown by the bank; lists the outstanding checks, deducts the total from the bank balance; adds any charges for telegrams, interest, etc., which are on the bank's books, but are not yet on the cash-book; and deducts any collections or other credits not yet entered on the cash-book. The result should be the balance shown by the cash-book. Where the account is very complicated, a more formal method is advisable, one divided into four tables: (1) We debit, bank does not credit; (2) we credit, bank does not debit; (3) bank debits, we do not credit; (4) bank credits, we do not debit. Starting with the bank's balance (1) and (3)

are added, and (2) and (4) deducted to make the cash-book balance. Or a tabular statement can be made in this form:

Bank's Balance	Our Balance
Add (1)	Add (2)
Add (3)	Add (4)

the two sides of which should balance.

This tabular form of reconciliation should be used in balancing any sets of accounts between two parties, when the reciprocal items are so numerous as to make the process complicated, as for instance, between the home office and a branch, or between stock brokers in two different cities, who are constantly buying from or selling to each other.

25. *The cash-book.*—The usual form of a cash-book carries the receipts on the left hand and the disbursements on the right hand page, but sometimes the receipts are carried in one book and the disbursements in another, in which case the pages are continuous. This is especially advantageous when either side contains only a very few items compared with the other, so that one page of an ordinary cash-book will be almost blank, while the other is entirely filled up. The disadvantage is that it is necessary to refer to both books in order to ascertain the cash balance. In a large business, that is sufficiently subdivided, this would not apply, as the actual cash account would then be kept on the treasurer's books.

26. *Columnization.*—The columns in a cash-book depend on the nature of the business. There should be a column for general accounts on each side, one for accounts receivable on the left, and for accounts payable on the right-hand page. Any payments for accounts receivable can be put in the general column, as they are

few in number. Special columns for cash sales or purchases of merchandise, for general expense or any other class of items that may be of frequent occurrence may be provided. "Cash discount" can be treated in either of two ways. In one case the amount of cash actually received is entered in the accounts receivable column and the discount in its appropriate column, both amounts being posted to the credit of the customer. The discount column in this case does not enter into the cash balance at all, the entries in it being really journal entries. When the whole amount of the bill is entered as paid and the cash discount is carried as an element of the cash balance it can still be carried in the same column by heading it "discount, debit account," and carrying it to the other side of the book at the end of the month where it will enter into the cash balance at the closing of the cash-book for the month and where it will be in the proper place for being posted to the debit of discount account. In the same way the discount taken on accounts payable paid is placed in a column headed "discount credits," although on the wrong side and is transferred and posted in a similar manner. The advantage gained is twofold, the saving of rewriting of the names in the journal or cash-book and the bringing together of the bill paid and the discount on it in close proximity where they can be compared, making it less easy to manipulate the books for small amounts through this account. Where customers are authorized to deduct freight from their remittances in any considerable number of cases a column may be carried for this item in the same way.

This idea is sometimes carried out to such an extent that a combined journal and cash-book is made with columns for all the principal accounts including debit

and credit columns for cash itself. It is not advisable to carry this idea of columnization too far in a cash-book, so as to include all journal entries on a compound journal cash-book. There are too many opportunities for covering up counter entries by making a journal entry take the place of one which was really cash. It is a very convenient form for the bookkeeper, especially if there is a column for each one of the principal accounts, but the entries on it are not nearly so easy to trace as those on the ordinary cash-book, and therefore it is not usually looked upon favorably by auditors. There is not so much objection to it in case a voucher is furnished for all journal items, as well as for those involving cash. Ordinarily a bookkeeper who may be very careful to require written authority in the shape of a voucher of some kind for the disbursement of even a small amount of money, will make a journal entry at the verbal request of any one authorized to give him instructions. But a journal entry may be as important as one on the cash-book and may involve as serious consequences. If the bookkeeper can smuggle into the journal a credit to a customer for returned goods, for allowances or for anything else, he can retain an equal amount from the cash payment made by that customer.

In the soft coal business, for instance, the freight is often more than the cost of the coal at the mine. The coal is sold delivered to its destination, the shipper assuming the freight. For convenience the receiver often pays the freight, sending the receipt with his check to balance to the shipper. On the books of the latter the customer is credited with the check through the cash-book and with the freight through the journal. One young man who was keeping books for a mine allowed his freight entries to lapse for considerable time and then

made them all at once in totals with no details. When his books were examined the accountant took the tonnage shipped to each customer for the period, calculated the proper freight, compared the figures with the journal entries and discovered a defalcation of over seven thousand dollars. The bookkeeper had made part of the freight credit do duty for a corresponding amount of cash which he had abstracted. The auditor's attention was attracted to the peculiarity of the absence of freight entries for several months and then of their being all made at once in lump sums, and the inquiry into the anomaly caused the discovery of the defaulter's method.

27. *Loose-leaf cash-book*—Whatever arguments may be urged for the use of other loose-leaf books, it seems impossible to justify the employment of any but a regularly bound cash-book. While the entries in a bound cash-book may be falsified, there is always risk of detection, which may be absent if a whole page may be abstracted and another one substituted for it containing entirely different entries, provided the totals forwarded at the foot of the page are the same. It is doubtful whether a loose-leaf cash-book would be admitted in evidence by a court, as there is nothing to indicate that entries were made at the time they are dated, and in the regular course of business. There is really no advantage gained by their use commensurate with the risk that is incurred and, therefore, their employment is seldom or never recommended, except by those so-called accounting concerns who are more interested in the sale of expensive blanks than in furnishing to their customers a system of accounts suited to the business.

CHAPTER VI

BILLS RECEIVABLE

28. *Definition of bills receivable.*—While the term “bills receivable” is almost universally understood, it would perhaps be better if it could be replaced by the more accurately descriptive term “notes receivable,” on the ground that in this country, when a person gives his written promise to pay a given amount, the document is invariably referred to as his note, while a bill is the creditor’s statement in writing, specifying the amount and character of his claim in detail.

The use of the word “bills” arose from the English custom of drawing on a customer a bill of exchange due as many days after sight or date as the terms of the sale warranted. When this bill was accepted, it became a “bill receivable” and this term was extended to cover the few instances in which a note was given. The bills are sometimes called “trade acceptances,” but this term alone does not distinguish between items which are receivable and those which are payable.

In old times in this country the English custom of drawing on a debtor on long time used to prevail, but it has gradually been given up in our domestic trade, so that the ordinary business man now thinks of a draft on a customer only as of one at sight, or a very few days sight, drawn on a debtor whose account is overdue and who may pay a draft to save his credit at his local bank, or who will remit if threatened with a draft. It is still the custom, however, to draw on foreign debtors at sixty

or ninety days sight, especially when the draft is accompanied by bill of lading.

When the bills receivable taken in a business are considerable in number, there should be a separate register for them. The most convenient form for the usual business house has a page or more for each month of maturity. The notes taken each month are listed on the pages of the months in which they mature, and the totals of these pages for each month in which they are taken are added together to show the total taken that month. The individual items are posted to the credit of the individual customers and the total to the debit of "bills receivable" account.

29. *Bills receivable discounted.*—When bills receivable are discounted in bank or paid over to creditors in place of cash, they should not be credited to "bills receivable" account, but to "bills receivable discounted." Although the note has been realized upon for virtually the same amount as if it had been paid, there still remains a liability for its face if it is not really paid at maturity. While this is only a contingent liability, it is none the less a real one, and should be expressed on the books. A reasonable time after a note is due, if it has not been returned unpaid, a journal entry should be made charging "bills receivable discounted" and crediting "bills receivable." On the balance sheet the items appear as "bills receivable" on hand, in an inside column (or "short") and under it "bills receivable discounted," the total of the two being extended into the assets column. On the other side appears the amount of "bills receivable discounted," as a contingent liability.

30. *How to ascertain a customer's liability.*—When a customer gives his note, it is usual to credit his account and charge "bills receivable." The result is that his

debit balance is either extinguished or at least reduced. Since it may be advisable to know what his total indebtedness is, in order to determine how much further credit to extend to him, various expedients have been adopted to show how much his unpaid notes amount to. As simple and effective a way as any is to carry in an inside column on each side of his account a memorandum account with his notes. That is, when he is credited with his note in the regular column, he is charged with it in the memorandum column. When the note is paid it is credited in the memorandum column. The balance shown in the regular column is his liability on open account, and the balance of the memorandum column is his liability for notes not yet due and paid. Both balances being on the same account are easily referred to, but of course only that in the regular column appears in the trial balance.

31. *Verification of bills receivable.*—The auditor should verify the bills receivable on hand by a comparison of the actual notes with the register, careful note being made of those that are past due. These should be charged to “suspense” much more promptly than open accounts, as from their nature they should be much more promptly paid. The notes which have been sent out for collection should be represented by the acknowledgment of the banks to which they have been sent. In auditing a bank the auditor should send out carefully worded notices to the parties purporting to have signed any notes above a certain amount, asking them to report if the notes are not regular, as the great danger in a bank is that dummy or forged notes may have been used by some officer to raise money for his own purposes.

32. *Calculation of interest—the “tickler.”*—In the

ordinary business house the interest on bills receivable is not usually taken into account at the end of a fiscal year or at any other time when a statement is made of the condition of the business, for it is usually too small an item to be worth taking into consideration. In recent bank statements, however, the item of unearned interest on notes has appeared as a liability. At first sight it would seem like a tremendous task to calculate the interest on all the notes in a large bank, but it is easily found, with perfect accuracy, by the use of the "tickler." This is a book containing a list of all the notes on pages representing the dates of their maturity, or due dates. These pages are already added up to prove their accuracy by comparison of their totals with the notes account on the general ledger. It is only necessary to treat each day's total as one note to reduce the number of interest calculations in the largest bank to about one hundred and twenty, as banks seldom have notes running beyond four months. If interest is paid regularly at fixed times on demand paper, the total of all the demand notes can be taken as one item with interest from the last regular payment day, leaving only the demand notes taken since, to be treated as separate items. Of course, the interest due on the demand notes would be an offset against the unearned interest on the time notes, the difference being the net unearned interest as a liability.

If it is desired to ascertain the amount of unearned interest on notes in an ordinary business the form of note register already suggested makes it easier to do so as the notes are there listed as to their maturity.

33. *Accounts receivable.*—The term "accounts receivable" is open to the objection that it is often made to cover all debts due by persons, whether they are cus-

tomers or officers and employés of the company. While accountants attempt to restrict the term to customers' accounts, their action does not bind the bookkeeper or officer of a company, who can thus make up a statement that is deceptive and yet is in a sense correct. If accountants were uniformly to use the title "customers' accounts," the business public would become accustomed to it and would learn to look with suspicion on the more comprehensive term. The English term "trade debtors" is really better than either of the others, since it allows the use of the similarly restricted term, "trade creditors," in place of "accounts payable." If either of the suggested expressions is used, no bookkeeper could include in the items covered by it any debt due by an officer or employé, except those legitimate ones which arise from purchases made by them, without making himself liable to the charge of a deliberate intention to deceive.

These accounts should be kept in a separate ledger or at least in a separate division of the ledger, if only one is in use. In the general ledger an account is kept in totals with the customers or accounts receivable ledger, which is called in England an adjustment account, and in this country a controlling account. Neither name seems as good as "representative account," since this account represents in totals all the items that enter into the individual accounts on the subsidiary ledger. One of the best illustrations is found in bank bookkeeping where the "depositors' account" on the general ledger represents the total of the accounts on the individual depositor's ledger.

In order to carry the controlling account on the general ledger it is necessary that the books of original entry shall have columns for the detailed items per-

taining to the accounts, so that the totals may be posted to the controlling account. As the charges to customers from the cash-book are very infrequent, however, it is not worth while to have a column for them, provided it is borne in mind that such items must be posted twice, once to the individual account of the customer and again to the controlling account. The same would of course be true with regard to receipts of cash from accounts payable.

34. *Debit balances of officers and employés.*—Reference has already been made to the cases where there is found listed among the accounts receivable the debit balance of an officer or employé of the company, usually an overdraft against salary as yet unearned. Such items should be very carefully inquired into, with a view to finding out whether the party has means other than his salary out of which he can make the amount good, if called on to do so. In making up the balance sheet or the condensed statement of ledger balances these items should not be included among the ordinary accounts receivable, but should be given an independent showing, since they are not legitimate book accounts like those arising from the sale of goods in ordinary course of business. Such overdrafts may be permissible occasionally when the parties are stockholders and there is a prospect of a dividend in the near future to take care of them, but as a rule they are a poor class of assets and should be discouraged as far as possible.

35. *Doubtful accounts.*—In taking off the accounts receivable for the trial balance, they should be listed in at least three columns, according as they are current, a short time past due or so far delinquent as to be considered doubtful. Accounts in the hands of attorneys for collection should be taken out of the accounts re-

ceivable entirely and placed in suspense, along with those of parties who have failed. Against the suspense account there should be carried a special reserve or contingency account of a size sufficient to cover whatever proportion of the suspended items their character would seem to necessitate, usually 25 per cent of the items of the current year, 50 per cent of those that are two years old, 75 per cent of those three years old, while all of those four years old should be charged off. By charging these percentages to profit and loss and crediting them to the contingent reserve account, the suspense accounts of each year are left on the books at their face value. There they can be looked after and yet they are not carried as assets for more than they may fairly be considered worth. The percentages will vary in different lines of business, according to the character of the customers. For instance in a house selling largely to clergymen the proportion of slow accounts is large, but eventual loss is very small. The moral risk in that case is considerably less than the mortuary one. When a payment is made on a suspended account it is the practice of some houses to reverse the entry that transferred the account to suspense by re-crediting suspense and charging the individual account again. The cash received is then credited to the individual account and the new balance is thrown back into suspense again by a journal entry. This is, of course, for the sake of keeping track of all the entries on the individual account. It is not necessary if a separate suspense ledger is opened with an account for each delinquent.

No fixed rule can be laid down for the classification of accounts receivable so as to determine when they become doubtful or desperate. The time depends on the character of the business. Supplies from produce com-

mission houses must be settled for within a week, while bills due to a tailor are not necessarily doubtful when they are over six months old.

In classifying the accounts as to age, the terms of the sale must be taken into account, if any of them have been sold with a future dating, for if such is the case the account is not past due until that date is past, although several months may have elapsed since the day of shipment.

A mistake that is often made in the treatment of suspense items is the neglect to provide the credit to "reserve for bad debts" against them. It is a very common thing to find these charged to a "suspense account" which is still carried on the balance sheet as an asset and, therefore, is included in the profits. Many a business man prides himself on his conservatism in promptly charging past due accounts to suspense, and it is often difficult to show him that he has changed only the name of the account and has not in any way altered its nature as an asset, unless he has at the same time opened a reserve account on the other side of the ledger, offset by a corresponding charge to profit and loss.

36. *Reserve for bad debts.*—In preparing a revenue account at the close of a fiscal period, the liability for loss from bad debts should be expressed by the auditor, unless it has already been taken care of by the prompt charge of every doubtful account to suspense and the setting up of a reserve account against it. He must do this by a debit to profit and loss and a credit to reserve for bad debts for such a percentage of the accounts as the experience of the business would seem to justify. Some say that this percentage should be on the amount of the total sales for the year, others that it should be on the balance due from customers at the

end of the year. Either method is logical, as the risk of loss is evidently proportioned to the amount of sales made and also to the amount still unpaid. The auditor is concerned only with insisting that one of them shall be adopted and that the reserve shall be adequate.

When such a reserve for bad debts has been set up at the end of a year, the actual losses during the next year are to be charged against the reserve and not to profit and loss. The reserve was the estimate of the probable loss. Charging the actual loss to it is simply expressing the result of the estimate, and proving its accuracy or the reverse. Any errors made in it will be adjusted at the end of the year when the new reserve is set up.

General business conditions should be taken into account by the auditor in recommending the amount of the reserve. In the same business, with the same general line of customers, the losses from bad debts will often vary largely in years of business depression as compared with prosperous periods.

37. *Proving up.*—In auditing a set of books it is not usual to do more than prove up the accounts receivable as a whole. The accounts payable are proved in the same way, where the books are kept in a proper manner. In such a set of books, where the three classes of accounts are kept distinct, it is a very simple matter to prove out the accounts receivable and payable, especially if a controlling or representative account is carried for each of them in the general ledger. In the ordinary cash-book and journal where all classes of accounts are entered in the same column, it is necessary to resort to the process of building up each class of accounts. When all the general items have been checked to the ledger, we eliminate all items so checked. If

the accounts receivable and payable are mixed on the pages of the ledger it will be necessary to prove them out as a whole. Starting with the net balance at the beginning of the period, we charge it with the total of the sales for the period, less any sales that we may have found charged to a general account, such as would be the case if one of the partners or officers had bought any goods which were charged to his drawing account. We also charge any journal debits, and debits from the cash-book. We credit it with the total receipts as shown by the cash-book after deducting therefrom the general items as shown by the check marks, with the total of the returned merchandise book, if such a one is kept and with cash discount, if that is carried in a column and the cash is entered net. The resultant balance should be the net balance of the accounts on the balance, which we proceed to prove by adding the ledger from the last ledger to the present one. It is very common for an auditor to check the trial balance taken off by the book-keeper, noting the starting balance as well as the ending one, but some auditors prefer to make their own balances, putting in the pages but not the names, and proving from their own previous balance to the new one, and there is no doubt that this is the safer plan, as it prevents the changing of a balance after an audit has been made.

By this method it will be seen that the accounts receivable and payable are not checked individually at all, but this is not necessary for the purpose of a thorough audit. It will not detect an error in charging or crediting the wrong party, but such an error can safely be left for correction to the person who will receive a statement with too little credit or too much debit. It sufficiently proves that all the debit items have been

charged and all the credit items credited to someone on the ledger.

As an absolute proof of the accounts receivable there is no method better than for the auditor to mail the monthly statements himself, accompanied with a request that any discrepancies be reported at once to him on a blank enclosed for that purpose. This is frequently done in England but is not so customary here, except with the national and state bank examiners, in checking up the accounts of the correspondents of the bank they are examining. Commercial houses are not accustomed to receiving these notices and are apt to misunderstand them and even to take offense at them.

In sending out these statements they should not be enclosed in envelopes bearing the return request card of the company or firm, but in envelopes with the address, though not necessarily the name, of the accountant. The reason for this is that if there has been any manipulation in certain accounts, the bookkeeper can furnish false addresses, the result being that the statements will be returned to the office of the company, where the bookkeeper can gain possession of them and destroy them, having in the meantime sent the corrected statements to the proper address.

CHAPTER VII

INVENTORIES

38. *Responsibility of the auditor.*—The responsibility of the auditor for the correctness of the inventory figures, that he uses in making up his statements, depends somewhat upon the nature of his contract with his client. He is sometimes employed to take the inventory himself, in which case he assumes complete responsibility for it. Usually, however, he is not expected to do more than satisfy himself that it has been correctly taken by parties familiar with the business who can be relied on to report the actual quantities on hand. The ordinary foreman is usually such a person. If left to himself he will make as correct a count as is possible, and he will ordinarily be left to himself, as few employers would care to put themselves in the position of asking him deliberately to falsify his report. The auditor, being thus reasonably sure of the correctness of the count, should examine the prices in connection with the invoices of purchases, to ascertain the basis of the valuation, and should prove the extensions in order to detect careless or willful errors. Unless errors in either valuations or extensions are discovered after thorough tests have been made, it is not generally considered necessary to prove every item.

39. *Raw material.*—The word “inventory” is usually applied only to those assets that are constantly changing or moving. Among these is “raw material,” which is any material that enters into the product of a factory

while it is still in the condition in which it was purchased and before any work has been done on it by that factory. The finished product of one factory may be the raw material of another. For instance, pig-iron may be made into boiler plates in one factory, these made into boilers in another and the last used in ship-building in another. The pig-iron, the plates and the boilers emerge from one factory as finished product to enter another as raw material.

40. *The market price.*—A custom which may lead to serious error, but which is frequently defended by manufacturers who indulge in it, consists in inventorying raw material at the market price when that is greater than the actual cost. It is claimed that the advance in price is a legitimate profit of the year in which it occurred, and the profit and loss account is given credit for it, while it remains as only a possible profit in case the market does not react before the material is made up and sold. The broad principle should be adopted that no profit can be depended upon unless the goods are actually sold, and that in the meantime the material should be carried at not more than cost. On the other hand, when the market price of the raw material has dropped since its purchase, the conservative man will carry it at the lower price in the inventory. In other words the advice usually given by the careful auditor is to carry the goods at whichever price is the lower, the original cost or the market rate. If this is an error, it is certainly one on the safe side, and if there are any surprises in store for the man who follows it, they will prove to be pleasant ones, while the other course may lead to consequences that will be disagreeable if not disastrous.

41. *Freight costs.*—The cost of getting the material into factory is a legitimate part of its value in the in-

ventory. Freight is one element of such cost, consequently "freight in" should always be kept separate from "freight out," the former being part of the cost of the material, while the latter is a selling or trading expense.

It is hardly necessary to say that the auditor must take precautions to prevent the inclusion in the inventory of any material that has not been paid for either in cash or by credit to the persons from whom it was purchased. Equally careful must he be to see that no goods held on consignment only are included. They should always be separately listed both as to the goods themselves and as to the credit account which offsets them.

42. *Product in process and finished.*—As soon as any work is done on raw material it becomes "product in process of manufacture," and the cost of the work done is to be added to its value. This is called "earned shop cost" and increases with each process until the goods reach the shipping room, when they are "finished product."

In an inventory of finished or partly finished goods nothing should be put down at a higher figure than its actual cost. The cost will include all the elements, direct and indirect, that have so far entered into the production of the finished goods or those in process of completion. The practice of listing finished articles at the selling price less the supposed cost of selling, is common, but cannot be defended unless some way is found to guarantee the future market price and also the selling conditions. The cost of selling for previous years is not always a safe criterion for the coming twelvemonth. With a given number of salesmen on the road, or a given running expense in the store, the comparative selling cost varies to a certain extent with the volume of

business done, so that a diminished trade would increase the selling cost and impose an additional burden on the current year that may be already showing bad results, owing to the reduction in the volume of trade and consequently in the gross profits.

43. *Complications with underlying companies.*—A complication arises in the case of a large company which is in reality a combination of several underlying companies. When the finished product of some of these companies is used as raw material by some of the others the question arises as to the basis on which the producing company shall charge out its product to the consuming company. Some accountants have taken the ground that all such charges shall be at actual cost and that no profit shall be shown until the material is finally worked up and sold by the finishing company, that unless this is done the inventories of the various companies will be carrying an unrealized profit on all material received from previous companies. As far as the regular operations are concerned, it would seem advisable to take over from one company to another products at a fair margin of profit, provided that by so doing the cost is not made greater than the same goods could be obtained for in the open market. In no other way could the earning value of each underlying company be ascertained, for otherwise the only earning company in the combination would be the one that finally finished and sold the goods. This reasonable profit would then become an entirely legitimate part of the cost to the consuming company in just the same way that it would have been a part of the cost in case the goods had been purchased from an entirely independent outside producer. From this reasoning it would appear proper for the consuming company to inventory all goods re-

ceived from a producing company at the price allowed the latter in the regular course of operations, in spite of the fact that in a sense the two companies are really one and participate in the benefit of the apparent profit that has been made. It might perhaps be clearer if this apparent profit is not called a profit as far as the general operations of the combination are concerned, but is considered a saving in cost.

44. *A uniform basis of valuation desirable.*—As the inventory is one of the principal factors in the revenue account, it is important that it shall always be taken on the same basis. It is clear that an overvaluation at the beginning and an undervaluation at the end of the fiscal period will reduce the profits of the period, and that converse treatment will increase them. It may not be so clear to an auditor, however, that it is his duty to advise that the basis shall not only be the same, but that it shall also be as nearly as possible, a true basis. Some men who pride themselves on their conservatism will take 10 or even 25 per cent off of the fair cost value of their inventories. In the long run, of course, it makes no difference in final results, but as between different years the basis of comparison is entirely destroyed if the inventories are not virtually uniform in value. A little reflection will show that, if the inventory is very small at the beginning and very large at the end of the year, and both inventories have been reduced 25 per cent below a reasonable value, the profits of the year have been understated by an amount equal to 25 per cent of the difference between the inventories. If the reverse conditions obtain the next year, the profits will be in a corresponding degree overstated, the result being that in two years of perhaps actually equal prosperity the conditions shown by the revenue statement may be largely

at variance. Unless the auditor understands the principles involved in the treatment of inventories he is liable to be puzzled when called upon by a client to explain some such anomaly as this.

45. *Machinery and tools.*—While the auditor is not supposed to be an appraiser, he is expected to know the general principles governing the valuation to be placed on assets appearing in the accounts. This is not difficult in the case of those which we have already considered. Being quick assets their value is soon determined, for if they are not quickly realized their deterioration is at once manifest. But the case is different with those assets that are designated as fixed, that is those that are intended to be kept for use and whose value is not to be based on what they would realize in cash. Among these are machinery and tools. There is apt to be some uncertainty as to the value to be placed on new machinery bought for a definite price but requiring considerable expense for installation. As the machinery is of no value to the business until it is set up, tested and ready for use, there seems no reason for doubting that its cost includes not only its original purchase price, but also all the expense legitimately incurred in installing it and experimenting with it until it is ready to become a producing power.

46. *Machinery made by the factory.*—When a factory makes some of its own machinery there is always a question as to the value to be placed on it when finished. One view is that it should be valued at whatever it would have cost if purchased on the open market from another factory. Mr. A. Lowes Dickinson clearly expresses what seems to be the correct view of this matter when he says:

Managers of the operating departments of a factory frequently claim that they should be allowed to charge a profit on construction work carried out for their own mills, on the ground that if the work were done outside they would have to pay a profit, and at the same time would set free their own facilities to carry out additional work at a profit for outside customers, and they even go so far as to say that if they cannot charge a profit on construction work carried out, they will in future have the work done on outside contracts. It must be admitted that this is a plausible argument, but a little further consideration will show that it is fallacious. There is here a confusion between a profit and a saving. The reason that a concern undertakes its own construction work in place of letting outside contracts therefor, is that it can by that means effect a saving in its expenditure by taking advantage of its own capital and facilities to carry out the work instead of using the organization and the capital of others, upon which it would have to pay a profit. The saving so effected is of considerable advantage, in that it reduces the amount of capital invested, and its future earnings will represent a larger return on the investment. Moreover, it is seldom true that the use of its own facilities for construction expenditure really means the throwing away of profitable work for outsiders, which would otherwise have been undertaken. It is doubtful if any well-managed concern ever refuses profitable orders, because of its own construction work. Its organization can and will almost automatically expand sufficiently to provide for any increase in its operations which is likely to be thrown upon it. Moreover, if a sum be added to the cost of construction and credited to profit and loss, to represent the profit which would have been earned by the company if the work had been done for outsiders instead of for itself, this profit can only be made available for distribution by increasing the amount of capital contributed for the new construction work, and it can hardly be considered good financial policy to increase indebtedness for the purpose of paying dividends. The only sound principle that can be adopted is to charge to

construction all costs and expenses which are directly attributable to that construction, but nothing for indirect expenses, interest or profit.

If this masterly statement of the matter needed any corroboration, it might be added that the operating accounts of the business as a whole, eventually realize the profit or saving by the reduction in the amount of depreciation that is annually charged off against the smaller valuation.

CHAPTER VIII

DEPRECIATION

47. Difference between depreciation and fluctuation.

—The auditor should be thoroughly conversant with the principles that govern the allowance that must be made for depreciation in the case of all fixed assets except land. It is important at the outset that he shall distinguish between “depreciation” and “fluctuation.” Depreciation is that lessening of the value of an asset that must necessarily take place in consequence of the use of that asset, while fluctuation is a change in value which is not caused by use but is the result of outside influences which may be either favorable or unfavorable. Fluctuation, therefore, may be either upward or downward, but depreciation must necessarily always be downward. As the fixed assets are not held for sale, but for use in producing floating assets that are intended for sale, the fluctuation in value is not an element of the manufacturing or trading operations of a business, and is, therefore, ignored in the accounts when favorable and only included in them, when unfavorable, when it is evident that the decline in value is permanent. Even then it must not be charged against the operating profits of any given year but against “surplus” itself, as an accidental or extraneous loss to be borne by the whole history of the business of which “surplus” is the epitome or general summary. A favorable fluctuation would, however, find expression

in the accounts in case of a radical change in the proprietorship as when a new partner is taken in, or an old one bought out, or when the entire business is sold to new parties.

48. *Depreciation always present.*—Depreciation, being inherent in the very nature of all fixed assets except land, must find expression in the accounts, and it is an auditor's duty to insist that it shall do so. It is often contended by a manufacturer that his machinery is kept in so complete a condition of repair that it is always as good as new for his purposes, and that no depreciation should be allowed for. While the auditor must take into consideration the extent to which repairs and replacements are made and can provide a lower rate of depreciation where these are ample than in cases where they are insufficient, it is still true that, however extensive the repairs are, there is a constant lessening of value from wear and tear that will eventually result in the necessity for a complete replacement. As this is a gradual process resulting from constant use, it should be expressed in the accounts by a gradual charge, in order that each year's operation shall stand its fair share.

49. *Causes of depreciation.*—The causes that bring about depreciation in an asset are:

(1) Employment or use tending to wear it out. The mere fact that a machine has been used at all, however little, makes it second-hand and, therefore, much less valuable. The fact that its market value has been largely diminished is not a measure of its depreciation, since it is not intended to be sold, but is a fluctuation in price to which no attention need be given.

(2) Lapse of time. Not only do such assets as machinery and buildings depreciate while being used, but the process continues while they are idle. In some

cases the depreciation is greater when idle than when in active operation.

(3) **Obsolescence.** Frequently when a machine has been in use satisfactorily for a comparatively short time it is rendered obsolete by the invention of a more effective machine for which the old one must be discarded. It sometimes happens that an unexpected enlargement of the business requires larger machines of the identical kind now in use, where two small machines are not as available as one large one or where the smaller is altogether useless, as in the case of a switch-board in a telephone company that has only one. In these cases the depreciation is extremely rapid, but nevertheless it must be provided for.

(4) **Accidents.** These include such contingencies as damages to overhead wires from sleet storms, lightning striking wires beyond the arresters, explosions in a gas-works caused by undetected leaks and similar occurrences that cannot be foreseen. They hardly come under the head of depreciation, however, and should be provided for by a separate reserve, except in those cases where the results would not be classed as catastrophes.

50. *Elements of depreciation.*—The various elements which determine the amount to be charged for depreciation of any asset are:

(1) The original cost, including, as we have seen, the cost of installation.

(2) The estimated life, or the time during which the asset may be fairly expected to do effective work. There are often a great many points to be considered in making this estimate. For instance the length of time which a gas main will last will depend on the character of the soil in which it is laid, on the climate, which may be alternately very wet and very dry, and on the nature of

the gas which may or may not contain chemicals which will corrode the iron. No hard and fast rule can be laid down for any class of assets, the only safe guide being experience under the same or similar conditions.

(3) The expenditure for repairs or maintenance. It is manifest that if a machine is allowed to become badly out of repair, it will deteriorate much more rapidly than one that is constantly kept in good order.

(4) The scrap value. If the object is such that it will have a considerable realizable value when it is no longer fit for use in a particular business, the depreciation would naturally be less than if it is of no value whatever or if the value is so small that it may be ignored.

(5) The probability of obsolescence. This would be particularly the case with special machinery of a new type which is liable to be materially improved upon, or that is intended to manufacture some article the demand for which rests upon some fashion or fad that may be evanescent.

Attempts have been made to construct from these data, depreciation tables similar to the mortality tables of life insurance companies. The variation is so great, not only between different classes of assets, but also between assets of the same class in different circumstances, that the auditor is wise who refuses to attempt such a task, but contents himself with ascertaining that the amount which is adopted as reasonable is based on the best obtainable data in regard to the particular assets with which he is concerned.

51. *Methods of charging depreciation.*—(1) Writing off an arbitrary amount. This is often done for the sake of equalizing profits, a large amount being charged off in very prosperous times and perhaps none at all when business is poor. This is not only a false statement of

the actual conditions of the depreciation, but it results in a false statement of the general operations of the business which ought to reflect the difference between good and bad years, and it should be unreservedly condemned by the auditor.

(2) Charging off a certain fixed percentage of the original cost, dependent on the estimated life. The objection to this method is that the charge is the same each year and there is no adjustment between depreciation and repairs. It is generally considered that as repairs are apt to be heavier in the latter years of the life of an asset, the depreciation should be heavier at first and should gradually diminish, thus equalizing the burden.

(3) Charging off a certain fixed percentage on the diminishing value. As the value diminishes, the amount at the fixed percentage will, of course, be less each year, providing for the increase of repairs and equalizing the total charge to operating cost. This method also provides for a small residual value, since the entire cost can never be fully taken up. For these reasons, this is the method usually adopted by the best authorities.

(4) The annuity method. Hatfield in his excellent work on "Modern Accounting," says that this "rests upon the assumption that the cost of production includes not only repairs and the depreciation of machinery, but as well interest on the amount of capital invested in the machine. Depreciation on this theory should be a sum figured as a constant annual charge sufficient not only to write off the decline in value, but also to write off annual interest charges on its diminishing value." After giving an example and the rule for ascertaining the amount of the annuity he continues:

The use of this system implies that at the time interest is charged to the plant there is a corresponding credit to interest

account, consequently the net result to profit and loss account taken as a whole is that there is an equal annual charge of depreciation and a diminishing annual credit for interest.

An objection to this method is that it introduces the custom of marking up the value of assets by an allowance for assumed interest. Furthermore, unless interest is charged on all capital invested, not merely on that subject to depreciation, there is a logical inconsistency in reckoning it in depreciation.

52. *Depreciation an estimate.*—A further objection is that it necessitates a complicated calculation to ascertain the exact amount that will be necessary each year to fulfill the conditions. It is an attempt to make an accurate statement of a problem which is not capable of exact treatment, for it must not be forgotten that the whole matter of depreciation rests entirely on an estimate. As Dr. Frederick A. Cleveland says:

In any case, however, a depreciation table is nothing but a forecast of the probable wasting of an asset. The table, itself, is a record of a judgment made in advance, which the book-keeper in a clerical way applies to the account to be handled. This judgment may be found to be erroneous and may not be borne out by experience. The accountant should, therefore, inquire both as to the premises or foundation for the initial judgment in accordance with which the table was compiled and as to whether, as far as possible, this result is checked by experience.

In conformity to this idea the auditor, in addition to the exercise of his best judgment, would do well to advise the periodical valuation of fixed assets by a professional appraiser. As this appraisal is usually made with a view to a possible fire insurance settlement, it may be higher than the net value at which the assets may be carried on the books. It is not obligatory to raise the book valuation in such a case, but it will be very

useful in determining the future rate of depreciation to know to what extent the past rate has varied from that established by the judgment of an expert.

58. *Expressing depreciation on the books.*—There are three methods of handling depreciation in the accounts.

(1) Writing down the asset by a charge to profit and loss and a credit direct to the asset account. By this method the original cost and often the insuring value are lost sight of. The cost of replacing an asset is the basis of fire insurance regardless of economic reasons which may make it advisable to carry it at a lower figure. In the case of a sawmill located in a lumber region where the stumpage will be exhausted in a definite number of years, the mill will be of little value at the end of that time and depreciation must be calculated with that consideration in mind for the purposes of the business, but that will not affect the insurance value in the meantime.

(2) Crediting a general depreciation reserve account with the depreciation on all classes of property. The objection to this method is that there is no way to tell just how any particular asset stands on the books, without analyzing the reserve account from the beginning.

(3) Crediting a specific reserve account for each individual asset. This is universally considered the best method, as it shows exactly the condition in regard to each asset. When an article is finally discarded its original cost is credited to the asset account and charged to the reserve, the new one replacing it being charged to the asset account. The relation between the asset account and the reserve being kept clear, it is always possible to ascertain whether a proper depreciation has been charged off.

The first and third methods may sometimes be advantageously combined when actual depreciation can be closely estimated, by writing down the asset to the extent of actual depreciation and in addition setting up a further amount as a reserve against possible obsolescence or accidents.

In the case of a wasting asset whose life is accurately known the first method may be employed, because the shrinkage in value is rather a result of consumption than of ordinary depreciation from wear and tear. Such an asset would be a patent right or a long term lease, both of which diminish in exact proportion each year.

54. *When an asset is sold.*—If an asset on which depreciation has been regularly credited to a specific reserve is sold, the proper way to enter the transaction on the books is to ascertain the actual carrying value of the asset, to credit the asset account with the original cost and to charge the reserve with the amount hitherto credited to it for that asset. The difference between these is the value at which the asset is being carried. The difference between this value and the cash received must be charged or credited to “surplus” as the loss or profit on the sale.

To make this possible and also for the purpose of obtaining valuable information in regard to the carrying valuation of specific items, such as machinery, it is an excellent plan to keep a list of such assets in a book provided with columns. On the line after the name of each asset and its original cost should be entered the depreciation charged against it, by the credit to reserve, for the year, the total of that column being naturally the total credit to reserve for the year. By bringing the totals forward each year the carrying value of an asset is at once ascertained.

CHAPTER IX

BUILDINGS

55. *Should be carried at original cost.*—Buildings owned by the business should be carried on the books at their original cost. In arriving at the cost of a building every item that enters into its construction or is caused by it is a legitimate element of the amount. If a building replaces an old one that was of no use at the time the land was purchased and that was not considered in the purchase price, the cost of tearing down the old building is a legitimate part of the cost of the new one. This would also be the case with a bonus paid to a tenant whose lease ran beyond the time at which the new owner desired to demolish the building. Of course, any money received from the sale of material from the old building would be a credit to the cost. Interest on the money paid to the contractors should also be included. If bonds are sold at a discount to provide funds for the building it is often claimed that the discount should be charged to the construction account as part of the cost, since it is in reality interest paid in advance, but this reasoning is fallacious, as we shall see when treating of the auditing of the bond account. Taxes and insurance up to the time the building is ready for occupancy, together with any other expense for supervision or administration are properly chargeable. The day that the building is completed and ready for use by its owner either for himself or for rental to others, all this cost stops and operating expense begins. After this the only additions to

the cost must be in the shape of items which are clearly and unmistakably betterments; that is, they must distinctly add to the value of the building. If they consist of the replacement of poorer by better elements, the difference in cost is the only thing that can be charged to it as an asset.

56. *Factors determining depreciation.*—No sooner is the building finished than depreciation begins. The general subject of depreciation having been discussed, it is only necessary in this connection to say that the amount to be charged off each year depends on the probable life of the building, which is governed by the strength of its construction and the character of the use to which it will be put. If it is to be filled with very heavy machinery it will naturally not last as long as if the machinery were light.

A greater allowance for depreciation should be made in the case of a building whose cost has included extraordinary items than where only the actual cost of material and labor has been charged to it. If the building is on leased ground and reverts to the holder of the fee at the end of the lease, the whole cost must be provided for during the life of the lease.

In the operation of the business an account should be kept with "building expense and repairs," which together with the depreciation will constitute the rent that the business pays. It is perfectly legitimate to include also a fair interest on the cost. If preferred, the operating expenses of the business may be charged a fair rental on the property, which will be credited to the "building expense" account, and in this way it will be shown whether the ownership of the property is a paying investment or not.

57. *Land.*—When land is owned it should appear on

the books at its fair cash value. This would be its cost if it were purchased by the business, or the fair market value if it were taken over at the formation of the company. Any permanent improvements, such as sewers, water pipes, roadways or sidewalks can be added to this value at their first cost. Repairs or replacements, such as repaving, must be treated as items of expense.

58. *When the land increases in value.*—One of the most perplexing questions in this connection concerns the value of real property. If a factory is started on land bought in an improving neighborhood and the market price of the land doubles in any given time, is it right to carry the land on the books at its increased value and thus offset the cost of replacing the building which has deteriorated to an equal extent? At first sight it would seem to be a proper thing to do, but it will not be so plain if we ask in what way this business has been benefited by the accidental rise in value. If conveniences in the way of better shipping facilities or cheaper railroad connections have tended to lessen the cost of handling the goods, some increase in valuation may be allowed as an expression of the value of the saving in expense, but if all conditions remain the same, it is difficult to see why the profits of the business should be swollen by the admission of an unrealized element, still less why a dividend should be based on such gain. If the land is actually sold and the factory moved to a cheaper location, there would be no objection, but until it is actually sold the profit is not realized and, therefore, not made. There is nothing to guarantee the stability of the new market price, which may drop back to the old figure and necessitate some awkward entries to the debit of the profit and loss account, especially if the supposed profit has been divided in cash among the

partners or stockholders. In a celebrated English case it was decided that the directors were personally liable for money thus paid out in dividends based on the increase of the value of land which was not sold, and which subsequently depreciated to such an extent as to impair the capital of the company.

59. *When land is donated.*—Another perplexing question is frequently met by the auditor when examining the accounts of a factory that has been induced to move to a small city by the conditional donation of land. We will assume that the land is fairly worth \$30,000 at the time the factory moves to the city, and that the conditions are that the title shall vest in the factory company at the end of five years, provided it shall have given continuous employment in the meantime to an average of three hundred men. Since the title is conditional, it is manifest that no value can be carried on the books to represent the land until the end of the five years, unless it is offset by a special reserve account of the same amount. At the end of the period when the title is perfected, the factory is undoubtedly possessed of an asset worth \$30,000 for which it never paid any money. On the theory that no asset can be carried at a greater value than its cost, there would be no way to put this item on the books, and yet it is plain that it should be there. If it is placed on the books as an asset for \$30,000 it is necessary to have a credit to offset it. Some accountants say that they have no right to credit the amount to profits and allow it to be the basis of a dividend to be paid in cash. They claim that it should be credited to "special surplus," but do not seem able to explain what will eventually be done with this account. Others claim that it is a real profit and available for cash dividends and defend their position by

saying that the transaction is, in essence, the same as if the company had been given \$30,000 in money and had then invested that amount in the land. The gift of the money would of course be a clear profit and would be available for dividends. In treating it as a profit, it must be as a sporadic or accidental profit and under no circumstances as an operating profit. A third method would be to credit it to "reserve for depreciation" and thus save the necessity for charging off depreciation for a number of years. This would be treating it as a profit (or the saving of an expense) but distributing it over the operations of future years. A compromise measure would be to declare a stock dividend of that amount, distributing \$30,000 of new stock to the old stockholders. This method also treats the amount as a profit, but specifically shows that it is a capital profit and not an operating one.

60. *Land bought for re-sale.*—When land is purchased, not for permanent occupancy but for re-sale, it becomes a commodity, virtually the same as the goods bought and sold by a trader in merchandise. When a large parcel is bought and subdivided for sale in city lots, the trader becomes a retailer. All the expenses necessary to bring the land into proper condition for sale are a part of the cost, and the unsold lots are to be carried at their proportion of that cost. The auditor in preparing a balance sheet for such a trader should exercise caution in valuing the unsold lots, as their value is not necessarily the same proportion of the total surface, since differently located lots would almost certainly vary greatly in value. The proper method would be to have all the lots in the tract valued separately in proportion to their proposed selling price so as to spread the total cost equitably over them all, and then to take an

inventory of the unsold lots at cost. It is sometimes claimed that interest on the capital invested in the land should be added to its carrying value as cost, but this does not seem to be defensible, as it is a marking up of the value for an arbitrary amount not actually expended. Even where interest is actually paid on notes given for part of the purchase money it is better not to add it to the cost, but to consider it as a general expense of the business and an offset against the final profits.

61. *The expression "real estate."*—The expression "real estate and buildings" is often seen in financial statements. In the interests of exact terminology, the auditor should avoid it. Real estate is "immovable property, usually confined to land and buildings erected thereon." It, therefore, includes the buildings. If it is desired to bring out the point that the company owns the ground as well as the buildings the proper term would be "land and buildings."

62. *Patterns.*—In a manufacturing company it is not uncommon to find very considerable sums carried as assets representing patterns. It is ordinarily impossible for the auditor to pass an authoritative judgment on the real value of these, but he should make very careful investigation as to how many of them are actually in use or are of such a character that they are likely to be used frequently. When special patterns are made for some specific work, not likely to be constantly repeated, they should be considered a cost of that work and should not be charged to pattern account at all. In case of a repeat order the advantage of having them on hand is likely to express itself in a lower bid for the work, rather than in an extra profit. Even stock patterns that are constantly in use should be carried with a very liberal depreciation, as they are liable to very rapid wear. All

of those which have been superseded by newer designs should be rigidly excluded from the inventory, unless the business is of such a nature as to call for large quantities of the old style article, as for instance a stove or range.

63. *Patents.*—An important item that is often found among the assets is patents. It is very difficult to arrive at any basis for their valuation on the books. Even when they have been in use for a considerable time and have proved their value as an earning power, there is always danger that they may be superseded by some improvement that will render them of little or no value. The auditor can be governed, however, only by what purports to have been paid for them, even when that is a large amount of stock issued to the patentee. Any further sums that are expended in the way of patent fees for completing or extending them are a legitimate charge against the account. The expense of legal fees in defending the patents or in prosecuting any infringers is also chargeable to the same account, in order to show the actual cost to the business, as the patents are of no value, until they are shown to be valid. Sometimes they are carried at no more than the actual cost of taking them out and perfecting them, and it is proposed to give them a further value by writing them up on the books. The auditor should always resist this, unless there is actual value given to the patentee, either in money or stock, as otherwise the transaction would consist of an arbitrary increase in an asset, which would have the effect, directly or indirectly, of increasing the surplus on account of an unrealized element. When the patent has an actual market value, it is difficult to find valid reasons for not expressing it on the books, except that it is a dangerous practice to write

up any asset whose character is not absolutely fixed and which is not intended to be sold or realized upon.

A patent should not appear on the books at all, unless it is absolutely transferred to the company, or at least a binding agreement has been entered into, giving the company the exclusive and perpetual use of it.

The depreciation to be charged against this asset should at least be large enough to extinguish it by the time it expires. Owing to the danger of its being rendered obsolete by improvements patented by others, the rate should be much greater than this.

In a merger of several companies the possession by one or more of them of valuable patents may be properly made the basis of capitalization allowance. To what extent they are to be valued must be left to the decision of the various parties in interest. Unless there is glaring evidence of fraud, the auditor must be guided by their judgment, as to the earning power and, therefore, the value of the patents.

CHAPTER X

INTANGIBLE ASSETS

64. *Good-will.*—All the assets, heretofore considered, have been what are called “tangible assets,” those that have a real, physical existence. There is another class, called “intangible assets,” whose consideration deserves careful attention, for while they may not be said to have a physical existence, it cannot be denied that they have an actual value. The most important of these is good-will.

Good-will is one of the most perplexing items that the auditor encounters, and sometimes it is one of the most important. It is undoubtedly true that a trademark or a name may have a great value, but how great is a very difficult point to determine. In a company where every dollar of the stock has been paid in, in cash, it is usual to charge all the expense of putting the business on its feet, including advertising, until there begin to be some returns from it, to the account of good-will, but how far this is to be allowed to go there is no one able to determine authoritatively. As a matter of fact the more prosperous the business is the more valuable is its good-will, but such a business is able to take care of its advertising and other extraordinary expenses, such as experiments, out of its own resources and does not need to bolster up its assets with anything intangible at all. It is before the business reaches this point and yet when it is showing indications of some day becoming valuable that it is difficult to determine

how far it is safe to go in allowing items of expense to be carried as an asset in this account.

65. *Definitions of good-will.*—In England, where this asset is much more generally recognized than here, this difficulty seems to have been insuperable. Dicksee says, "It is obvious that no general definition of good-will can be satisfactory." He quotes definitions given by different judges in passing on cases involving this point, and then sums up the matter by saying:

All that can be gathered from the above definitions is that where the locality of a business premises makes the trade, good-will represents the advantage derived from the chance that customers will frequent the premises in which the business will be carried on; that where the business is one which depends upon the reputation of a firm, the good-will consists of the advantage which the owner derives from being allowed to represent himself as such; that where the value of the business is due to the individuality of the owner, and where its reputation cannot be separated from his, the good-will is all but nonexistent; and that where the value of the business depends on its business connections, the good-will consists of the right to be properly introduced to those connections.

All this tends to show that the exact nature of good-will fluctuates with the class of business to which it refers, and that no general definition can be of any good, and it is better that it should be so. The absence of a hard and fast definition enables the court to take evidence and to determine the rights of the parties in accordance with the meaning given to the word good-will by those who are in that class of business or profession in regard to which the litigation has arisen.

It will be noted all through Dicksee's remarks that he treats the matter as one which is liable to be brought into court for the determination of the value of the good-will. This is in accordance with the greater rec-

ognition given good-will in England than in this country.

In regard to the nature of good-will, he says further: "The only necessary elements appear to be these; a positive element, enabling the person who acquires it to represent himself as the successor to the business of the person from whom he acquired it; and a negative element entitling him to restrain the transferer of the good-will from soliciting the old customers of the business which has been transferred."

Good-will is recognized as property by the English statutes and is always treated as property between purchaser and seller. In this country it is so recognized by some of the states, but it will be found that courts and lawyers are very far from having any very clear ideas on the subject.

66. *Rights of buyers and sellers of good-will.*—The purchaser of a good-will has the right to advertise that he is the owner, and if he has acquired the business from a former owner, to represent himself as the successor and the only successor to the business.

The position of the seller of a good-will in regard to competition with the purchaser is that he must not solicit business from the old customers of the firm by using any information or advantage that comes from his previous connection with the business, but he is not obliged to refrain from going into the same business and soliciting trade by a general appeal for it, unless he has entered into an agreement as part of the sale of the good-will that he will not do so. Before leaving the old connection he has no right to make a list of its customers with a view to soliciting them. In case of bankruptcy and a sale of the good-will by order of court, any partner of the old firm can solicit from the

old customers, as his parting with the good-will was not a voluntary act on his part.

Frequently the most valuable of the rights which should pass to the man who acquires a business is the right to use the name under which the business has made its reputation. This cannot always be done, as for instance in the case of a doctor or lawyer selling out his practice. It would naturally be a hazardous matter for a lawyer to practice under the name of another in such a way as to lead to the inference that the latter is the actual practitioner. But in ordinary business concerns where the name has been long before the public, the original parties may have been dead for many years and yet the business be carried on under the old name.

In the case of one partner selling out to the other all his interest in the business, including the good-will, the sale carries with it the exclusive right to the use of the firm name. A Chicago instance of this is the well known firm of Lyon and Healy. When Mr. Lyon sold out to Mr. Healy, he did not expect to go into business again and sold the right to the old firm name to Healy. He afterwards changed his mind and went into the same business and tried to prevent Healy from using his name in the old business, but he was not successful. The retiring partner cannot use a name calculated to deceive, nor even use his own name as late of the old partnership in such a way as to convey the impression that it is the old firm that is carrying on the new business. This applies, of course, only to those cases where the sale of the good-will expressly includes the right to use the old firm name in its entirety. Unless this is done, neither partner can use the name of the other in the new firm name.

If the good-will consists largely or altogether in the

use of certain trade-marks or names the right to their exclusive use would naturally be included in the sale of the good-will.

67. *Valuation of good-will.*—The valuation of the good-will of a business comes under the notice of the auditor whenever the share of a retiring or deceased partner is sold to the remaining partners or to a new partner; when the new partner is taken into the firm, all the old partners remaining, or when the whole business is sold out to new men, or when a number of firms or corporations combine to form a new one.

The conditions that the auditor must take into consideration, in advising as to the basis of a valuation, include the disposition of the retiring partner to assist or to oppose the new combination to the extent of his power, or whether it is beyond his power either to assist or oppose.

In arriving at a basis for valuation, the most important point is, of course, the earning power of the business. But this should be judged in connection with the amount of capital necessary to carry on the business and the amount of work necessary on the part of the purchaser as manager. That is, the earning power is the net profit after allowing a fair rate of interest on the capital employed and a fair rate of remuneration to the manager, unless the business is such that no manager is necessary, except the one already employed whose salary has been already included in the expense of the business.

Other things being equal the income which can be produced with the least capital outlay will command the highest good-will, even after interest on capital has been allowed for.

Business which calls for the least amount of skilled

superintendence on the part of the proprietor will command the highest good-will.

If the good-will is founded on a monopoly or quasi-monopoly it will be worth more than would be the case if competition is keen. If the monopoly is founded on patents this would apply only in so far as it is improbable that subsequent patents will make them practically valueless.

If the value of the good-will depends on the right to carry on the business at the old stand, it would be affected by the length of the term for which the premises are held, the danger of a competitor acquiring the premises at the end of the lease, or of an increased rental being demanded.

68. *How many years should be considered?*—The precise number of years to be taken into consideration in valuing the good-will is very difficult to determine. Dicksee gives a number of different cases, varying from manufacturers at one to three years purchase up to newspapers and other quasi-monopolies at ten years purchase, but he does not give any reason for his classification. He says, however, that where remaining partners buy out a retiring partner the value should be 25 per cent more; and that when a company buys out a private partnership the rate should be greater, since the investors in a company's shares, usually, look only at the rate of dividend earned and any excess above usual rates of interest could be capitalized as good-will, and as their liability is limited they are prepared to pay a higher price than the private purchaser who risks his whole fortune in the venture. He, therefore, thinks that the good-will of a corporation should be placed at twice that of a partnership.

69. *To determine earning power.*—In determining

the earning power of a business the results of a series of years should be taken into consideration, as one or two years may show abnormally large or small profits. The course of the business should also be taken as a guide, that is the question whether the profits are steady, are increasing from year to year so as to show a healthy growth, or are diminishing. It should also be noted whether any new conditions have arisen which would affect the profits and whether those conditions are likely to continue. A case in one of our courts illustrates all these points. A patent medicine concern lost \$9,000 the first year, \$5,000 the second; made \$4,000 the third, made \$10,000 the fourth—making them just about even—and the fifth year made \$119,000. A broker was put on the stand and asked to value the stock. He said that the stock of a company of \$100,000 capital that made \$119,000 in one year was worth at least 600, but accountants who testified denied this and claimed that the abnormally large earnings should be disregarded unless they could be shown to be sure to continue for the succeeding years. As the last year was the only one when the present manager had had full charge of the business, and as the parties bringing the suit were trying to oust the manager, the accountants testified that in their opinion the last year should be ignored altogether in estimating the good-will.

It is generally considered that it is necessary to go back from five to ten years to ascertain the average earning power of a business, depending on its character. We have seen, however, that it is not always safe to rely on the average only, without taking the other conditions into consideration.

70. *Good-will as a capital asset.*—Dicksee, as well as other authorities, claim that good-will is a fixed or cap-

ital asset, because it is something which has to be acquired in order to carry on the business at all. Variations in the value of capital assets are not supposed to affect profit, therefore, fluctuations in the value of good-will should not be allowed to do so. If in a going concern increase in the good-will is credited to profits, there results a swelling of the profits which is not realized and which is liable to shrinkage. As the increase in value is caused by the increase in actual profits, and as these profits have already been taken into account, the addition of the increased value of the good-will to the profits will cause a doubling of the apparent gain and thus may lead to the impression that the business is doing twice as well as it really is, and may also lead to increased dividends or personal expenditure not authorized by the real conditions.

Good-will appears legitimately in the accounts when it was actually paid for in acquiring the business, or where one or more retiring partners are paid off by the remainder of the firm. It may also appear when certain definite expenditures have been incurred for the purpose of creating a good-will such as advertising or any other legitimate expense of establishing a business on a profitable basis.

Although the English authorities all agree in saying that good-will is a capital asset and that it should not be charged off at any time to profit and loss, they yet claim that it is undesirable to carry it in the accounts, but they do not seem able to suggest any way to handle it when it has once made its appearance.

From the auditor's standpoint there is no doubt that it would be better to keep this account off the books entirely, as Dicksee and others advise, but there seems no way to do it except by charging it off to profit and

loss, unless the capital is reduced. In the case of a new business it can be done by charging all the expense of establishing the business to "development expense." This may look like simply giving a different name to the same thing, but it is apt to work out differently, because it will seem more imperative gradually to charge off an account that is professedly an expense account than one representing itself as the synonym for the earning power which is constantly increasing in value and, therefore, does not call for any diminution on the books. In the case of a company taking over the business of another at an enhanced value on account of its successful efforts to establish a reputation, the new company could issue its stock at a sufficiently high premium to pay for the good-will and yet leave its capital the actual representative of the tangible assets taken over. This would avoid the necessity of carrying good-will as an asset of the company or of charging it off against profits. In the case of one partner being bought out of a business by the others, where he is given more than the book value of his interest as an equivalent for his share of the good-will, the bonus thus allowed could be charged pro-rata to the continuing partners, instead of being charged to good-will as is often done. Similarly if a new partner buys into a business, paying more than book value for his interest, the excess could be credited or paid to the original partners. In a bank where all the assets are required to be tangible and actual, the good-will is represented by the excess of the market value of the stock over book value, and the same principle could be applied to the stock of any incorporated company or an interest in an ordinary partnership.

71. *Good-will and stock watering.*—The greatest objection to carrying good-will on the books as an asset

is the fact that the term has so often been used to cover water in the stock. For the sake of appearing to have a large capital many companies will issue large blocks of stock that really represent nothing at all, unless it be the prospective dividends that they hope to make. In crediting capital account, something has to be debited, and unless the plant and franchise account is made to carry the burden, there is no other place for it except the good-will account. This has been so much abused that there is a decided objection nowadays to the name on a balance sheet.

This condition must, however, be recognized by the auditor. When he finds that in a merger or consolidation of several companies, the difference between their net worth and their capital and bond liability has to be charged to good-will to make the accounts balance, he must accept the condition as he finds it and let the item stand although it may be much larger than any amount which could be arrived at by calculating any reasonable number of years purchase. He can comment on it in his report as being an inflated value, but he cannot avoid it, because there is no way to reduce it, since he cannot correspondingly reduce the fixed liabilities, and it would be strenuously objected to, if he took the only other course and opened the books of the merger company with a debit balance of surplus, otherwise a deficit. The only thing he can insist on is that the shortage in assets shall show in the good-will account plainly, instead of being hidden in an over-valuation of the tangible assets, especially when these are grouped together in some such comprehensive term as "plant, franchise, etc."

The expression of the value of good-will in terms of years' purchase means that the profits of the number

of years designated should be added together to form the agreed value, or that the average of a greater number of years should be ascertained and multiplied by the designated number of years. For instance, if the agreement is that the good-will shall be valued at three years' purchase of the average of the last ten years, and that average is found to be \$10,000 per annum, the good-will would be worth \$30,000.

Sometimes it is agreed that the excess of earnings over a certain rate shall be capitalized at that rate as the value of the good-will. In that case the average excess earnings are divided by the decimal representing the rate to find the amount. That is, if the rate is 8 per cent and the average earnings are \$4,000 more than 8 per cent on the capital, the \$4,000 is divided by .08 to find \$50,000 as the value of the good-will, the theory being that since the business itself earns 8 per cent the good-will must be \$50,000 to earn \$4,000 at the same rate.

Dicksee says that if good-will is put on the books through purchase and is afterwards charged off against "surplus," a secret reserve is thereby established, but his contention does not seem to be tenable. There is no doubt that the balance sheet will show a smaller surplus than before, but since there is now no good-will among the assets, there is nothing secret about the statement. It is true that the net earnings to date, represented by the surplus, will be lessened, and it might appear that the earning power of the business had been misrepresented. But a balance sheet standing by itself is no criterion of the earning power. That can be ascertained only by a summary of the profits and losses of a series of years. In making such a summary it would necessarily be disclosed that there had been

charged against surplus not only sundry dividends, but also the amount of the good-will. However it is regarded, the element of secrecy seems to be lacking.

72. *Deferred charges as assets.*—Closely allied to good-will as an asset are items that are known as deferred charges. They are in reality expenses, but differ from those which are at once chargeable against revenue in that they were not incurred for the current year alone, but were intended to benefit future years as well. They, therefore, hold an intermediate position between real assets and ordinary expenses. When the organization expenses of a concern have been large, it is manifestly unfair to charge them all off against the first year's operations, since subsequent years will receive an equal benefit from them, if they were legitimate and proper. They can be carried as an asset, to be charged off during as many years as is thought reasonable.

73. *Advertising.*—Advertising is often an item of this character, when its object is to create a demand for specific articles that are staple with a manufacturer. How much should be charged off during the current year and how much carried forward to the future would depend on the character of the goods advertised and the probable continuance of a demand for them in the future consequent on the advertising. Of the same general nature are various devices to induce custom that, strictly speaking, are not advertising and are better described as "promotion of new business," such as the sale below cost of electric appliances, signs, etc., by an electric lighting company with the idea of making a demand for its current. Since the profit on the current sold will continue for a number of years, the loss on the appliances should be spread over the future,

usually for three years, being carried in the meantime in the temporary asset account.

74. *Development expenses.*—Where stock has been donated to furnish funds for development purposes, the development expense is charged temporarily in appropriate accounts, but these accounts are not deferred charges, but are offsets to the credit established when the donation was made, and are carried nominally as assets for statistical purposes only.

75. *Interest, rent, etc., paid in advance.*—Other examples of deferred charges are interest, rent, taxes and insurance paid in advance, insurance differing from the others in having a realizable value by cancellation. Interest may be said to have an actual value also, realizable if the notes on which it is calculated are paid before maturity. There may be corresponding deferred credits, if any of the items are accrued but unpaid liabilities. This is almost always the case with labor. In treating these items, it is the custom of some to open accounts with them, such as unexpired insurance, which is charged and insurance credited, but this is often a waste of time and space, since the same object is gained by making the proper profit and loss entry directly to the one account, with the result of leaving a balance in that account which designates the amount to be carried as an asset or a liability, being the unused portion of the item. The same remarks apply to the practice some have of opening an inventory account and carrying it through the entire year on the books where it means absolutely nothing. The same object is attained in a much more logical way by leaving in the "merchandise purchase" account the value of the goods on hand, as a debit balance to represent the purchases that have not been used. An analysis

of the purchase account will show this plainly. At the end of the fiscal year the account shows all the purchases made to date. It makes no difference when they were made, therefore, the inventory at the beginning may be ignored. All these purchases have been consumed except the amount on hand. Expressing the amount used by a charge to profit and loss leaves a balance in the purchase account of unused purchases on hand. It is difficult to see why it does not belong in that account instead of transferring it to another account, inventory. But if anyone wishes to open the latter account at all, it should at once be closed back into purchase account at the opening of the new year, as it is undeniably purchased from the inventory account again as soon as the business of the new year begins.

CHAPTER XI

ACCOUNTS PAYABLE

76. *Hidden liabilities.*—In the examination of the assets the principal thing the auditor has to guard against is their overvaluation, either by giving those that actually exist too great a value or by including those which are valueless or those to which title has not been acquired, as in the case of goods, included in the inventory, which are held on consignment or for which no credit has yet been passed through the books. As these are positive items of record it is not very difficult to trace them and establish their true character. The case is different with liabilities, where the danger lies in omission, which is naturally more difficult to detect, since there is nothing on the surface to which attention would be called. The auditor must, however, be on the alert to discover if possible, whether any liabilities have been omitted, as he will undoubtedly be blameable if there are any clues to their existence which he has overlooked. If there is nothing in the accounts which would lead him to suspect any such undisclosed liabilities he cannot be held liable for not having discovered them.

77. *Verification of accounts payable.*—Accounts payable should be verified by comparing the last statements received from the creditors with the accounts on the ledger or the entries on the “audited invoice register.” This will detect the omission of any liabilities to parties having open items in either place, but will not discover the suppression of such items, where only

one bill was bought from a house since the last one was paid. There is no way to guard against this kind of a falsification of the records in a house too small to have an elaborate system of checking goods into stock, but it will be discovered at the time of the next audit if the auditor is careful, as he should be, to note the dates of the statements paid then and to assure himself that all those dated during the period covered by the previous audit had been included in the liabilities shown at that time. In the meantime there is no way to prevent an office manager from reducing his liabilities and thereby swelling his apparent profits, if he wishes to do so by holding out all of the invoices from one or more houses, especially if they are parties from whom he seldom buys. In a properly constituted business the method of checking goods into stock would prevent this, as the invoices would have to take their regular course and the auditor would at once discover any interruption in its regularity.

It might be thought that the auditor could verify outstanding liabilities by communicating with the creditors, but a little reflection will show that in the case of those who have sent in monthly statements this would be unnecessary, and in the case of those who have not, or whose statements have been suppressed, it would be impossible, since he would have no record of them, unless he discovered goods in the inventory which had been bought from them, but which were not represented by any credit.

In case he finds that any account payable of a considerable amount has been disposed of by journal entry, the auditor should inquire very carefully into the reason for the entry. It may be that it is made entirely from the viewpoint of the house and is not acquiesced in by the creditor; that is, it may be a disputed claim which

the house is determined not to pay, but which it may nevertheless have to meet eventually when the case is brought into court or is otherwise decided against it. In the meantime it is at least a contingent liability and should not be lost sight of as such.

78. *Unpaid taxes, interest, rent, wages, etc.*—There may also be liability for unpaid taxes, for bond interest accrued but not due or for rent in arrears. There is almost always at the time of closing the books and making a profit and loss statement, a liability for wages earned but not payable until after the books are closed. In the case of taxes, interest and insurance, if the liability is to be shown each month, so as to equalize the charge, the monthly proportion would be credited to "reserve for taxes," for interest and for insurance and the actual payments charged against the reserve account, so that the one account would be sufficient to show whether there was an accrued liability, or if there had been payment in advance, an earned asset. This is seldom done, however, except in a monthly closing cost system.

79. *A railroad's liability for tickets sold.*—In case of a street railroad company that sells tickets it is often the practice to credit the whole amount of the ticket sales to earnings the day they are sold and to pay no attention to the liability that exists in the tickets outstanding. There is a double error here, for the earnings account is credited only with the net proceeds of the tickets and no attention is paid to the discount at which the ticket is sold. The proper way is to credit "tickets" with the net proceeds from the cash-book, which should have a column for "ticket sales," and at the end of the month, credit the same account with the amount of the discount, charging it to "ticket discount."

As each conductor makes his report he divides his receipts into cash fares and tickets. The whole of his receipts is credited to "railway fares," cash and tickets being charged with their respective amounts. In this way the face value of the tickets outstanding is always shown on the books.

This is only possible when the tickets are made detachable, so that one ticket is torn off and given to the conductor for each fare. If the tickets are made in the shape used by many suburban steam roads, where the ride is paid for by punching a number out of the ticket, there is no way to keep any account of the unused portion of the ticket outstanding. At the best it could be approximated only by an estimate which could not be made reliable.

80. *Coupons redeemable in merchandise.*—Some stores in country towns and small cities issue books of coupons redeemable in goods, and credit the full value of the books to merchandise as soon as issued. When the coupons are redeemed over the counter they are cancelled and filed away, but no account is ever kept of them and there is no way to ascertain how many of them are outstanding at any time.

These are some of the kinds of liabilities that the auditor must look out for and if possible ascertain, or at least must call attention to them in his report. Where the method of treating them in the accounts is defective, it is his duty to call attention to the defects and to recommend the remedy for them.

81. *Bills payable.*—Dicksee says that "notes payable" present but little difficulty to the auditor, the return note being the voucher for the payment of notes matured, while the notes running, as shown by the notes payable book, will explain the balance of the notes pay-

able account in the ledger. He refers to the fact that notes of considerable amount may be negotiated without any entry being made on the books, but dismisses the subject by saying that the auditor should make enquiries at all of the banks with which the client is connected, and such further enquiries as may be feasible. He does not seem to realize that unrecorded notes would not be likely to be in the regular banks of the client, but rather in the hands of personal friends, or sold through the instrumentality of a dealer in commercial paper.

82. *Contingent liabilities on endorsements.*—One of the most difficult things for the auditor to ascertain with absolute certainty is a possible contingent liability. On bills receivable discounted the matter is simple enough, but it often happens that one or more officers of a company will make an individual bill payable, endorse it with the company's name and get it discounted, placing the proceeds to his or their credit. Of course it still shows as a liability, unless it is drawn against or has been made to cover an overdraft already existing. But even where the liability remains on the books, there is a great difference between a debt due to an officer of the company, and, therefore, under his control, and a note in the hands of a third party who may suddenly demand payment. But unless a memorandum is made of such a note in the bills payable register there is no way for the auditor to discover its existence, unless he notices that interest is paid out when there is no regular note of the company on which interest is then payable. If he finds such an item he must follow it up until he ascertains the note on which it was paid and if that note is not shown on the books as at least a contingent liability, he must insist that it be so entered. This is

especially urgent when his report is to be used as a basis for credit in bank or with creditors.

83. Accommodation paper.—Accommodation paper is harder to locate, especially when it is given for the accommodation of the other man, but there is liable to be some trace of it left, which may escape the attention of the auditor if he is not on the lookout for the reason of any peculiar entries. If each party to the trade takes up his own note the transaction would be shown by the check given and the deposit made, but if the other party takes up the note of the auditor's client and returns it to him there would be no clue to the affair, unless the cancelled note is found among the regular bills payable that have been paid and filed away. If the auditor has not been able to find any trace of such transactions, he must content himself with the statement of the officers of the company that they are not indulging in the practice of kiting. He is not responsible for not discovering the existence of unrecorded notes, if there is nothing on the book which would excite his suspicions.

84. Bonds.—Bonds may appear in the accounts on either side, according as they are issued by the company or held as an investment or in a sinking fund. As there is little difference in the practical handling of the accounts, they are treated under the head of liabilities, as that is where they are usually found in the ordinary company.

The auditor is interested in the different classifications of bonds, only to the extent to which his duties vary in regard to the different kinds. In an original investigation in regard to mortgage bonds, he should examine the original record of the mortgage or a properly certified copy, in order to ascertain whether there

are any provisions as to a sinking fund, or a periodic redemption of any portion of the issue by lot or otherwise. It is not his duty to ascertain whether the mortgage is a first lien, though there are instances on record where the auditors have discovered and called attention to prior liens that have been overlooked.

Debenture bonds, as a rule, are a general charge against all the assets, and are really nothing more than notes payable. But occasionally they are made a charge against specific assets, amounting to a lien on them and it is the duty of the auditor to examine the trust deed to ascertain whether such a condition exists.

If the bonds are income bonds, which are payable only out of funds provided by net profits actually made, the duty of the auditor is to see that no dividends are paid out of the profits until the payment of the bonds has been made or provided for.

In the same way the auditor must acquaint himself with the conditions incident to any issue of bonds and ascertain whether they have been complied with. Unless there is power of substitution in the trust deed, the company has no right to sell any of the pledged property, without retiring an equivalent amount of the bonds, even if it at once buys more valuable property of the same kind. There may be a provision for the carrying of a minimum amount of fire insurance to protect the bondholders. All these conditions should be known to the auditor and he should report any violation of them.

85. *Unissued bonds an asset.*—Unlike unissued stock, unissued bonds are to be carried as assets, though they are best shown on the balance sheet as a deduction from the credit balance of the total authorized issue. Hatfield says that there is no essential difference between them and stock. There is this radical distinction—un-

issued stock has no value whatever, while unissued bonds are a part of the authorized issue which is secured by a mortgage on the property. This lien gives them value, which is in abeyance as long as they are in the hands of the company, but which becomes operative as soon as they are acquired by others. Therefore, treasury bonds are just as good collateral for loans to the company itself as they would be to others who had bought and paid for them.

Bonds, unlike stock, can be sold by the issuing company at a discount, without any liability on the part of the purchaser for the difference between the purchase price and par.

86. *Bonds sold at a discount.*—When bonds are issued and sold at a discount, all authorities agree that the discount is an anticipation of interest, because if the rate of interest had been made higher, the bonds could have been sold at par and the burden of the additional interest would have been distributed over the life of the bonds. Arguing from the fact that the discount was in reality interest, it was long claimed, even by accountants, that it was chargeable to the capital account of the property for the acquisition of which the bonds were issued, as for instance a building or plant. There is no doubt that interest paid on funds used in the erection of a building *during the time occupied* in completely finishing the building is chargeable as an element of its cost. It does not by any means follow that the discount, which is confessedly the equivalent of interest to be paid in the future, long after the building is finished and in use, is in any true accounting sense any element whatever of the cost. It has been so treated apparently, because it was the easiest way to dispose of it, until now the custom has virtually as-

sumed the sanction of an economic law in the minds of business men.

87. *An improvement on the common method.*—An analysis of the true nature of the conditions may show a better method of treating this subject, although it is doubtful whether it will ever be possible to change the accounting practice now in vogue. If it is agreed that it is wrong to show the discount as a part of the cost, it can, of course, be carried in the balance sheet as a nominal asset, in the nature of interest paid in advance. The presence of such an item among the assets will naturally meet with objections. To meet this criticism and at the same time to represent accurately the true condition, it would be necessary only to show the discount where it actually originates, in the bond account itself, by carrying that account at the amount actually realized. There is no doubt that a liability need be carried only for the amount that the company is at present liable to pay. If the bonds are sold at a discount to-day, it is because they are worth no more than the net amount realized, and if the company were in funds, it could repurchase them for virtually that amount. If this is true, the present worth of the liability is only that amount, and there is no accounting reason why it should be shown for any more on the balance sheet, if the eventual liability representing the face of the bonds at maturity is also shown in parenthesis. This is the practice very largely adopted in England, where it seems to have arisen from the fact that companies frequently issue debentures redeemable only at the option of the company and that these debentures are often issued and also retired at a discount.

If this plan of carrying the bonds is adopted, operating interest should be charged each year, and the bond

account credited, with the annual proportion found by dividing the discount by the number of years the bonds have to run. In this way the bond account will equal the face of the bonds when they mature and each year will have carried its share of the interest, as it should have done, and as would have been the case if the bonds had been issued at the higher rate of interest.

Whatever plan is adopted, the auditor must strenuously oppose the charging of the discount to the investment account. Fortunately he is not obliged to depend entirely on theory to defend his course, since he can now quote as authority the Inter-State Commerce Commission, which has definitely instructed the railroads to charge the discount to "discount on bonds."

88. *Bonds sold at a premium.*—When bonds are sold at a premium it is always a perplexing question as to how the premium shall be treated. Some accountants claim that it is an accidental profit of the year in which the bonds are sold, and if the amount is small there is no real objection to treating it as such to the extent of offsetting it against the cost of printing and issuing the bonds, or against other organization expenses. But if the amount is large it is not fair to subsequent years to burden them with the higher rate of interest and give the advantage to the year in which the bonds are issued. The better way would be to carry it as a deferred credit which would be annually reduced by a proportionate credit to interest.

89. *The basic rate of interest.*—If bonds are bought at a premium or discount it is clear that the coupons do not represent the interest on the actual money invested since the premium or discount will disappear when the bonds are paid at their face at maturity. In the case of bonds bought at a premium each coupon

contains its proportion of the refund of the premium, and since each refund reduces the amount of the actual money invested, the principal entitled to interest is a constantly reducing quantity. The actual rate of interest realized is called the basis. To illustrate, if bonds are bought at 110 bearing 6 per cent, and running such a time as to make the actual rate or basis 5 per cent, when the first semi-annual coupon of \$30 is paid it is not right to credit the whole of this to interest, as the bond is now six months nearer maturity. As the basis is 5 per cent, the interest on \$1,100 for 6 months would be \$27.50 which should be credited to interest and \$2.50 to the principal, reducing the latter to \$1,097.50. The next coupon would have to provide interest on this at 5 per cent, or \$27.44, with \$2.56 to go to the credit of the principal. At the maturity of the bond the principal will be reduced to par.

In the case of bonds bought at a discount, the basis rate would be greater than the coupon, and the principal would be charged with the difference since the bond becomes more valuable as it approaches maturity.

In keeping the account with the bonds the face of the bonds may be kept in one account and the premium and discount in another, or the account with each issue of bonds may be kept in double columns, the first being a memorandum column of the face of the bonds, and the second the amount at which the bonds are carried. The latter is the better way when a number of different bonds are carried as an investment, or in case of a bond dealer.

Bond dealers charge each class of bonds bought to a separate account at the amount paid for them, and the interest to date of purchase is charged to "accrued interest," which is carried as an asset. At the end of

each month the accrued interest of all the bonds on hand is calculated and the difference between this amount and the face of the account is charged to accrued interest and credited to interest. When bonds are sold, the bond account is credited with the price realized and the difference between that and the value at which the bonds were charged is credited or charged to "bond profit and loss." The interest received on the bonds in the sale is credited to accrued interest and so are any coupons that may have been collected. In this way the accrued interest account always shows the amount of interest accrued but not due as an asset and the interest account the amount which has been earned to date.

90. *Sinking funds.*—In order to secure the payment of bonds more effectually there is often a provision in the trust deed that the company shall establish a sinking fund. This has been defined as a species of financial arrangement by means of which a fund is created to reduce or extinguish a debt, either already incurred or about to be incurred. The debt to be thus provided for is ordinarily represented by bonds or debentures of some kind that are due in the comparatively remote future and which are not redeemable before maturity. The fund thus provided should be actually invested in interest-bearing securities and should be sufficiently increased each year to enable it to amount, with compound interest, to the entire sum represented by the debt at its maturity. The annual contribution that should be made to the fund may be ascertained by the compound interest tables based on the rate of interest expected to be realized, but this theoretical calculation will not work out in practice, because of the impossibility of investing the odd amounts to be dealt with, unless the in-

terest used in the calculation is so low that it can be realized from deposits in a savings bank.

In the case of a fund to provide for bonds due very far in the future, there is also the probability of a decided reduction in the rate of interest that can be realized on investments in the future, as it is a well-known fact that the rate of interest obtainable on safe investments has been steadily declining and will probably continue to do so. In making investments for this fund it is always preferable to purchase as far as possible the bonds for the redemption of which it was established. When this is done, the bonds are not cancelled but are held as an investment in the same way as any others would be and the coupons are collected and reinvested exactly as others are. Otherwise the fund would be deficient at its maturity, and in the meantime the general operation of the business would be relieved from the payment of interest on the bonds cancelled. When bonds are issued in series payable annually, the taking up of the bonds each year is altogether different from the establishment of a sinking fund and therefore the bonds thus taken up are charged off the books and cancelled.

91. *Sinking fund not chargeable to profit and loss.*—As a rule the business that issues bonds for the purpose of raising money to carry on its operations is obliged to invest, to a very large extent, all its available funds, whether derived from capital or bonds, in fixed assets and seldom has more than enough floating or active capital to take care of its active liabilities. When a business is confronted with the necessity of raising a definite sum each year and transforming it into a fixed asset such as a sinking fund must necessarily be, the only way it can do this is by accumulating the sum by not dis-

tributing all profits among the stockholders. For this reason it is said that the sinking fund must be paid for out of profits. While this is true in the sense that profits must furnish the money, it by no means follows that the sinking fund is chargeable to profit and loss as many, even among accountants claim. By analyzing the nature of a sinking fund we see that the fund is in reality a device for paying off the bonds and that as the original proceeds of the bonds when issued were not credited to profit account, the charge for their redemption must not be charged to it.

This is reasoning back to the original nature of the sinking fund. By carrying the subject forward to the final entries when the fund has performed its work we will reach the same conclusion. If we have charged the sinking fund off to profit and loss each year we must have set up a reserve account as a credit offset or else we would have been obliged to credit the sinking fund account, thus wiping it off the books while still holding the actual asset in the fund. If the reserve account has been set up we would have at the maturity of the bonds, say for \$100,000, the following accounts open on the books:

Bonds, cr.	\$100,000
Reserve for bonds, cr.	100,000
Sinking fund, dr.	100,000

Realizing on the sinking fund and with it paying off the bonds we would have still remaining a credit of \$100,000 to "reserve for bonds" with no bonds outstanding and therefore no necessity for the reserve. The only way it can be disposed of is by a credit to profit and loss again. But it is manifest that there was no object in having charged it to profit and loss at all if it has now to be recredited.

The whole confusion arises from a failure to comprehend the true character of the sinking fund as a change in the name of an asset from cash to sinking fund without in any way changing its character as an asset.

If the money used to establish the sinking fund had been used to buy part of the bonds and retire them, charging the amount to bonds, there would be no question as to profit and loss. But the sinking fund is in effect no more than the debit side of the bond account carried in a separate account temporarily, for convenience only.

It might be thought that this is merely an academic question with no practical bearing, but it has a decidedly practical aspect, when we consider that it is the duty of an auditor to prepare a balance sheet which will tell the truth. If he puts into it a liability of reserve for bonds for a large amount he is depleting the surplus to that extent and thereby deceiving any stockholder who does not know enough about accounting to realize that the account is a fictitious one. In fact those accountants who defend the account do so by saying that the object is to so reduce the surplus that stockholders will not clamor for dividends, but they have never explained how the auditor became invested with the authority to deceive stockholders, even when he thinks he is doing it for their own good.

In order to meet their views and at the same time make a true statement, it is only necessary to divide the surplus into two parts, the first one being "fixed surplus" invested in the sinking fund bonds, and the second "free surplus," available for dividends, the sum of the two being extended in the balance sheet as "total surplus," thus giving the stockholder exact information as to the book value of his stock. The Inter-State

Commerce Commission in its bulletin of July 1, 1909, makes it obligatory on the railroads to do this, using the term "appropriated surplus" instead of fixed surplus. It is not necessary to open an account on the books for this appropriated surplus, as the division can be made on the balance sheet only.

A reserve account should always be a credit. It is the expression of the judgment of the managers of the business of the probable loss or expense that is likely to be met with. If the exact loss was known it could be charged off at once, but since there is an uncertainty about the amount that will be lost from depreciation, bad debts and other like items, the reserve account is set up to provide for the contingencies. When the charge is a definite one, such as "bond interest," it is a misnomer to call the account "reserve for bond interest." It should be "bond interest accrued."

A fund must always be a debit account, consisting simply of the setting aside of money or securities for a specific purpose. It is purely a financial expedient to ensure the possession of ready money to meet the object for which the fund is established when the necessity for its use arises. A reserve account can be set up without any fund to represent it, and a fund can be established without any offsetting reserve account. There is no necessary connection between them whatever.

CHAPTER XII

CAPITAL STOCK

92. *Capital of a partnership.*—The auditor has many problems to face in connection with the issue and the subsequent treatment of the capital stock of a company. Even if it is considered that he is not acting as an auditor but as a practical accountant when he supervises the original entries in a new corporation, his duties as auditor concern these entries when he is investigating a company whose books were opened up by others.

In a partnership the capital of the firm is the net worth, or the excess of the assets over the outside liabilities. In a corporation the matter is more complex, since the amount of the capital stock is fixed and is not necessarily the excess of the assets, there being often a difference that has to be adjusted. If the excess of the assets is greater than the proposed capital, the overplus must be credited to surplus, which will be available for dividends, unless it is specifically set aside for a definite purpose, in which event it should be distinctly "ear-marked" as an appropriated surplus.

93. *Capital of a corporation.*—If the excess of assets is less than the capital of the new company, it is necessary to adopt some plan by which an equilibrium can be reached. There are several ways of accomplishing this object. One is to increase the book valuation of the fixed asset, such as "plant," sufficiently to cover the deficit. This is, of course, very objectionable, as it puts false figures on the books, and the expedient is

still more opprobrious when several items are grouped in one account, such as "plant, franchises, etc." In a manufacturing company the items of patents and patterns are often swollen to an abnormal extent. As it is extremely difficult to arrive at the true value of either of these items, the auditor cannot always object to the valuation placed upon them by the board of directors. Or the deficit can be charged to good-will as an expression of the value of the business built up by the old firm, when the company is one that has taken over an old business. This is unquestionably the best plan, as the position is then honestly stated and any one examining the balance sheet of the company will be able to see what are the real tangible assets at a fair valuation, and can make up his own mind as to whether the good-will is or is not as valuable as it is rated. In a company starting an entirely new enterprise there can be no such thing as good-will to begin with. To the extent that any of the assets, including good-will, are overvalued the stock is said to be "watered." The only way to avoid watering the stock under these conditions is to have the stockholders donate a sufficient amount of their stock to cover the deficit, and to carry it as "treasury stock" until a surplus has been accumulated, out of which a stock dividend can be declared, returning the stock to them. The obvious objection to this is that the original stockholders would lose the advantage supposed to be gained by watering the stock.

94. *Opening the books of a corporation.*—The legal steps to be taken in incorporating a company are usually in charge of an attorney, but the auditor should know what they are in the state from which the charter is obtained, and should ascertain whether all the requirements have been met.

In opening the books of a company, many accountants use a number of accounts that are opened only to be at once closed, such as "subscription" and "plant and sundry assets." The modern American accountant does not look with favor on these useless accounts, but prefers to state the facts as they are with as little circumlocution as possible. He, therefore, makes his first entry to show the subscription to the stock, "subscribers, to capital stock" for the amount of the subscribed stock. If the number of subscribers is small, the names and subscriptions may be detailed on the journal and an account opened with each on the general ledger. If there are many of them the entry may say "as detailed in subscription register," which is a book containing the names and addresses of the subscribers and the amount of their respective subscriptions. From this book the amount of each man's subscription is posted to the debit of his account in a "subscription ledger." Where there are many payments, especially where the stock is called up in installments, it is well to provide a column in the cash book for subscribers. When a man's subscription is fully paid, whether a certificate is issued to him or not, he should be credited on the "stockholders' ledger" with the face value of his stock. In many of the books kept in stock by the stationers, the stockholders are debited with their holdings, which is a manifest error and arises from a confusion between the functions of a subscription ledger and a stock ledger. The account of capital stock on the general ledger is of necessity a credit account. The stock ledger is merely the detail of the general ledger account, and it is easily seen that the parts must be of the same nature as the whole.

It is better to have a specially ruled stockholders' ledger, but it is not absolutely necessary. The ordinary

form of ledger will do if the columns are double. In each account, are shown on the credit side the date and number of the certificate, the source from which obtained, the number of shares and the face value. The source is either original, in the case of the original subscriber or the name of the person from whom transferred. When stock is transferred the stub of the new stock certificate shows from whom it came, and the old certificate should also show the name of the person and the number of the certificate to whom it goes. In this way the stock can be traced either forward or backward. The stock ledger account of the transferrer shows on the debit side the name of the party to whom transferred, the number of the certificate surrendered, the number of shares transferred and their face value. If the entire number of shares shown by the surrendered certificate is not transferred the balance retained should be shown by a debit to "self" and a credit of the same amount for the certificate issued for them. In every case where a transfer is made the whole certificate transferred should be cancelled and charged out and a corresponding number of shares issued and credited. An exception to this rule may be made in the case of treasury or trustee stock from which a large number of transfers may be made. As this stock remains under the control of the office the account with it can be only kept on the books, and only the transferred stock need be represented by actual certificates. It is necessary to remember that the title to stock resides in the record on the books and that the certificate is only the evidence of that title and is not the stock itself. The total of the balances on the stock ledger must always be the balance of the capital stock account on the general ledger.

95. *Payment for stock.*—The stock having been subscribed, it remains for the auditor to see that it has been properly paid for. This is evidenced by the credits to the subscribers. When property of any kind is turned over in payment, a journal entry is made specifying the property turned over, at its valuation, and crediting the subscribers who have transferred it. Reference must be made to the records of the board of directors authorizing the transaction and the auditor should examine the minute book to see that the record sufficiently describes the property and that the offer to transfer it to the company, for the stock, was properly made and accepted. He has nothing to do with the real value of the property, except in states which require that the value should be equal to the par value of the stock given for it. If there were a manifest difference, it would then be his duty to call attention to the fact that the stock was not fully paid up.

If stock is sold at varying prices, as frequently happens in the case of mining companies, the auditor must consult the minutes of the board to ascertain whether the officers were authorized to sell at the prices shown by the books. If any officer or employee receives all or a part of his salary in stock when it is being sold at a discount to others, the salary account should be charged with the cash value only and discount on stock with the difference between that and the face.

96. *Verification of shares outstanding.*—The auditor should always examine the stock certificate book and check up the stubs with the stock ledger in order to see that all the certificates issued are represented there, and he should take a trial balance of that ledger to see that the total shares issued agree with the record of stock issued on the general ledger, until all the stock

is finally issued. After that an occasional test of the outstanding stock would be all that was requisite. It is not necessary for him, as a general thing, to examine the transfers. The stock that has been transferred should always be pasted back on the stub from which it was taken. The stubs that have no certificate attached would then represent the outstanding stock, and if their total agrees with the capital stock account, the auditor's duties would be ended. If the total does not agree, the easiest way to find the discrepancy is to list the open stubs in numerical order; numbers and amounts only, and then to post from the stock ledger the pages on which the numbers appear credited to the stockholders, being careful to note that the amounts are the same. This will detect any number that had not been posted or any appearing on the ledger and not represented by an open stub.

If a trust company is the transfer agent or registrar of the stock, the auditor is relieved from the necessity of verifying the outstanding shares.

97. *Stock sold at a discount or premium.*—When original stock is sold by the company at a discount for cash and the proceeds invested in a fixed asset such as a manufacturing plant, the usual custom is to charge the discount to the cost of the asset. This is manifestly wrong, since it puts a fictitious value on the books, but it is extremely difficult to determine just what should be done with the discount in those cases where the stock is not regularly sold at a discount. The proper charge to "discount on stock," while it accurately represents the condition, causes a very awkward item to appear on the balance sheet, which it would be very difficult to persuade the directors to allow. If it has to be covered up at all, the furthest stretch, the auditor would appear

justified in countenancing, would be a charge to some such account as "special plant expense" to be written off against profits in a very few years.

When stock is issued directly for the property, the auditor's duty, theoretically, is to follow the same course. In practice, he will find it very difficult to do so, because he has usually no way to prove what the real value of the property is, unless the case is a very simple one and the property is easily appraised. He is, therefore, usually obliged to let the judgment of the board of directors determine the value, unless there are clear reasons for him to think otherwise, but even then he must be very positive that his conclusions are correct before he ventures to criticise the action taken.

If stock is sold at a premium the disposition of the premium depends on the conditions. If it is intended thus to provide for extraordinary organization expenses, the premium may be offset against those expenses, the difference if any being carried into the surplus account. If provision is made in the by-laws or articles of association for the consecration of the premium to a permanent surplus not available for dividends it should be earmarked by being credited to an account called "permanent surplus," which is a better term than "special surplus." In the case of a national bank the term surplus is sufficient, since it has a special meaning, not being under the control of the directors but of the controller. If there is no provision with regard to the premium, it is unquestionably an ordinary surplus, though it is contributed and not earned, and would be under the control of the directors for purposes of dividend. In the absence of express provisions the mere calling it a special reserve would have no effect on its real character as a surplus.

98. *Different classes of stock make great care necessary.*—The duties of the auditor of a company that has different classes of stock make it necessary for him to prevent injustice being done one class to the advantage of another. If there is non-cumulative preferred stock, he must be very careful in his examination of the closing entries for the year. If there are not profits enough to pay the preferred dividend for the year he must satisfy himself that all the elements of the revenue account are properly stated and that the profits are really as small as they appear. But it may not appear to him to be equally important to ascertain whether the profits are not seriously overstated if the preferred dividend is paid and there is also a considerable dividend paid on the common stock. Yet it may be that through a manipulation of the inventory, or in some other way, the profits of the year are swollen to an abnormal amount at the expense of the succeeding year, in which the preferred dividend may consequently have to be passed.

99. *Unpaid dividends on cumulative preferred stock.*—In the case of cumulative preferred stock on which all the dividends have not been paid, he must know how to treat the unpaid dividends on his statements. If the dividends have been earned, that is, if there is a real and unimpaired surplus of profits on hand, there is no question but that there is an actual liability to the preferred stockholders to the extent of the surplus that is applicable to such dividends, and this liability should be shown on the balance sheet. But if there is no divisible surplus, there is no liability actually existing, since dividends can be paid only out of surplus, but a contingent liability exists to pay the dividend if a surplus is earned in the future. In a

balance sheet intended for creditors there is no occasion to show this contingent liability even as a memorandum, because the eventual creation of the liability, of necessity, means the creation of surplus funds out of which it would be paid. In a balance sheet intended for the stockholders, however, it must be shown, because the preferred stockholders are entitled to know that they have a lien on the future profits to that extent, and the common stockholders have equal right to be warned that they cannot expect dividends until the accrued preference dividends are provided for. As it is impossible to show this liability in the actual total without showing a corresponding deficit in the asset column, it can only be indicated by a note or memorandum appended to the balance sheet.

100. *Treasury stock*.—The term treasury stock is employed very loosely and often erroneously. When stock has once been legally issued for full value and has been donated to the company or purchased by it and held subject to the disposal of the board of directors, it is, at least in theory, worth its face value and can be carried as an asset. This is true treasury stock. When the stock is only that which has not been subscribed for at all, or if subscribed for has not been taken up and paid for, it is not treasury stock, but unsubscribed or unissued stock and has no asset value whatever, since nothing has been paid for it. Instead of an asset it is, as Mr. Conyngton says, “the privilege of creating a liability.” The auditor should note this difference and not be led into the error of wrongly designating the stock in the hands of the company.

The auditor should also know what the status of treasury stock is, in the state from which the company's charter is derived, as in some states the possession of

the stock by the company acts as a cancellation and it cannot be reissued. Again, in some states the stock having been once fully paid in theory may be put in the treasury and sold at a discount without liability on the part of the purchaser, while in others any insufficiency in the original payment for the stock will inhere in the treasury stock and make the purchaser liable to outside creditors for the discount. To avoid this the stock is sometimes placed in the name of a trustee, but this is usually so transparent a subterfuge that no advantage is gained except the privilege of reissue.

Stock of its own held by the company or by a trustee for the company is no longer active, that is, it cannot vote, nor is it entitled to any dividend. The latter provision is obvious, since if a dividend were paid on it out of the profits it would at once return to the credit of the surplus account, out of which it had just been paid.

101. *"Donated working capital" account.*—Treasury stock usually results from a donation for the purpose of providing working capital for development work. The charge to treasury stock account should therefore be offset by a credit to "donated working capital." If the stock is sold at a discount, treasury stock should be credited at the face value and donated working capital debited with the discount, either directly or by first charging it to "discount on stock." The reason for this is that the real working capital is only the actual money realized and used in the development of the property and the discount lost on the sale is a lessening of the original nominal value of this fund. The balance of "donated working capital" account would then always be equal to the stock in the treasury at par, plus the

amount of cash realized on stock sold, and when all the stock is sold it would be the actual cash realized.

As the money thus provided is expended it is charged to the various accounts representing the development work, until it is finished. These accounts are then closed out against the donated working capital account. This is the only logical method, as the working capital was donated for this express purpose and the books should show that the purpose was carried out. It does not seem that the donated stock is in any sense a surplus, as some claim, unless it is specifically given for that purpose by the stockholders.

102. *Secret reserves.*—We have now examined all the items that usually appear on a balance sheet, except the surplus, the consideration of which will naturally be in order after the steps leading up to it have been investigated.

The balance sheet, as we have seen, is a statement of the condition of business as shown by the ledger, the various items being entered at book value. If the auditor is satisfied that these values are such that the condition is made to appear more favorable than it really is, there is no question as to his duty. He must insist that the figures be adjusted to show the real condition. But if the contrary condition exists and the position of the business is shown as less favorable than it really is, there is a difference of opinion among authorities as to the duty of the auditor. The business is then said to possess a "secret reserve." It may take several forms, but in general terms it consists in undervaluing the assets or overvaluing the liabilities. The object in establishing it is to provide out of excessive profits of prosperous years a fund which can be

drawn upon to increase the profits of less prosperous ones, a sort of governor to make the machinery of the business appear to be running at a nearly uniform rate. No one can dispute that the establishment of the reserve is good policy. The contention is not as to the advisability of the reserve itself, but whether it should be secret, and if so, whether the manager is justified in establishing it without the knowledge of the directors, or whether the directors only should be authorized to establish it without the knowledge of the other stockholders.

Mr. Francis W. Pixley, one of the most noted accounting authorities in Great Britain, said at St. Louis in 1904:

I am of the opinion that what are known as secret reserves are right and proper, and tend toward the maintenance of the company as a permanent institution, and that in fact, without these secret reserves it is quite impossible, having regard to the fluctuation of both financial and trading operations, for any company to exist beyond a very limited period. At the same time these reserves must be honestly made and in the interests of the company. For directors to create secret reserves with the object of withholding profits legitimately earned from distribution to the stockholders, so as to induce them to dispose of their holdings and acquire such holdings for themselves, is as flagrant an act of dishonesty as can be conceived; and should auditors have any reason to believe that reserves are being created through improper motives they should protest against this, and if necessary so report to their shareholders. Where, however, reserves are made bona fide in the interests of the company,—although the auditors may consider them beyond what may be actually required—they are in my opinion justified in passing them without comment, knowing that in so doing, the financial position of the company will be strengthened.

It is only fair to Mr. Pixley to say that he takes the somewhat remarkable position that "the duties of auditors of a company are to that company as an institution and not to its individual shareholders."

Mr. A. Lowes Dickinson says in this connection:

It is obviously within the discretion of the managers or directors to make reserves to meet possible contingencies. Inasmuch as the majority of industrial corporations do not publish their gross earnings such reserves can easily be made and *are* made continually in a form in which they do not appear in any way in the accounts, and are known therefore only to the directors and managers. Each case must be judged on its own merits. Where the directors or managers have exercised a wise discretion in providing in advance for contingent losses which are incident to the nature of the business and cannot, from a reasonable point of view, be considered in excess of the amount which a wise foresight would provide, it would seem that no exception should be taken to the undisclosed portion thereof. Where, however, reserves are made largely in excess of any possible contingencies the amounts provided should be disclosed so that all those interested may be in a position to form a reasonably correct opinion as to the financial position. For instance a business such as banking is peculiarly liable to large and unexpected losses, the disclosure of which might prejudicially affect its credit and possibly cause a disaster out of all proportion to the cause; and it is obviously sound policy to accumulate such ample reserves as will enable losses to be met without any apparent disturbance of normal conditions, but as far as the majority of corporations and businesses are concerned, publicity in such matters is undoubtedly most desirable, and all reserves to meet contingencies which may occur in the future should be fully disclosed.

Both these authorities seem to be guilty of what the lawyers call a *non sequitur*, since they reason that because it is conceded to be a good thing to establish ade-

quate reserves against contingencies, therefore secret reserves are to be allowed, provided a wise discretion is observed, but they do not say what a wise discretion is, nor who is to be the judge of its wisdom.

108. *Injustice worked by secret reserves.*—Those who defend the establishment of a secret reserve seem to look upon the bank or company as an unchanging entity, and claim that it is wise to conceal abnormally large profits one year so as to provide against the necessity of showing unusual losses in another year. In the case of a close corporation or of a partnership whose stockholders or members know all about the business, there would be no serious objection, but there would also be no special reason for doing it. It would then be about on a level with the practice of the suburbanite who sets his watch five minutes ahead so that he may be sure to catch his train. In the case of a company whose stock is somewhat scattered, and may be sold at any time on the basis of the statements furnished to the stockholders, it seems impossible to find any justification for the practice. The seller of such stock is unquestionably defrauded out of the increased price that he could have obtained if the true condition had been known to him and to the buyer. If the buyer happens to be one of those on the inside, with knowledge of the secret reserve while the seller is ignorant of it, the injustice to the later is still more flagrant.

To obtain a clearer idea of the justice of such a practice it is necessary only to look at the true nature of a corporation. It is not probable that any one would defend the managing partner of an ordinary copartnership if he deliberately understated the profits so as to prevent his partners from drawing out a greater dividend than he thought proper. But the president and

directors of a corporation are simply the managers of a partnership affair, the act of incorporation being for the purpose of limiting the liability and for greater convenience of action, but not in any way causing the company to differ from an ordinary partnership other than in these points.

The auditor who is acting for the stockholders of a company would not seem to be justified in signing a certificate to a statement which contains a secret reserve or any other element that is not exactly in accordance with the facts. Not only is he bound to tell the entire truth for its own sake, but he is also under obligations to give all the stockholders all the information in his power. Those accountants who take a different view of this question defend their course on the ground that they are employed by the president and directors of the company and are not supposed to criticise their management of the business. While it is true that it would be better to follow the English practice and have the auditor appointed by the stockholders as their special representative, it does not seem clear that the appointment by the directors absolves the auditor from his duty to the stockholders. Although not made directly to them, his report is to be used by the stockholders, and it should be as carefully prepared as if made originally to them and should contain nothing which would cause any stockholder to make an incorrect deduction as to the true condition of the company.

It may be objected that the secret reserve is often contained in items that have temporarily or permanently risen in market value above the cost at which they are carried on the books, and that the conservative man is opposed to writing up the book value and showing an unrealized profit. The answer to this objection is that

exception is not taken to the reserve, itself, but only to the concealment of it. It is not necessary to write up the value on the books if in the balance sheet or other statements submitted to stockholders the increased value is indicated in a parenthesis or note.

The point that it is intended to make clear is that the business belongs to the stockholders and that they are entitled to all the information about it that it is possible to give them. If they make a foolish use of it by insisting on the payment of unwise dividends or in any other way, it is no one's concern but theirs, and without their express consent no one is authorized to constitute himself their guardian in the administration of their property.

CHAPTER XIII

THE REVENUE ACCOUNT

104. *Nominal accounts showing results of operations.*

—The subjects so far treated have been the items appearing on the balance sheet, that is, the assets and liabilities, or real accounts. The auditor is equally concerned with what are called the nominal accounts, those which express the operations of the business and the result of these operations in eventual profit or loss. At the end of any fiscal period these accounts are brought together in (closed into) a statement of the transactions of the period, which is called the “revenue account.” This is subdivided into tables corresponding with the different departments of the business. The purpose of this division is to allow of the tracing of the relations between the same elements of a business for different periods, so that an increase or decrease of the final net profit may be explained by the increase or decrease of the various elements. These tables are usually in four classes, exhibiting the results of the manufacturing, of the trading or selling, the administrative or proprietorship departments and the final disposition of profits.

In making up these tables there is room for great difference of opinion. Some will put more into one table than into another and there is no final authority for determining how each table shall be constructed. The only way for the auditor to make up his own mind is to imagine that each table represents the statement of

an individual, charged with the duty of manufacturing, selling or financiering, that each individual is anxious to make the best possible showing for his department, and that they have all agreed to leave the decision to his arbitration. He must then decide what are the essential elements of the manufacturing, the trading and the administration and make each one of them assume the burden that belongs to him. For this reason he should understand the general principles which will guide him in the distribution of the items, and while he may not follow the same plan in different cases, he should always do so in making statements for different periods of the same business; otherwise his basis of comparison between different periods will be different and, therefore, may be misleading.

The various elements of the revenue account and the way in which they appear in it will be taken up under their appropriate headings in the following pages. It is mentioned here only because it is the end and aim of all the nominal accounts and must be kept in mind in treating of them.

105. *Sales*.—It is hardly necessary to say that sales should be kept in an entirely separate account from purchases. The old-fashioned "merchandise account," to which purchases were charged and sales credited, was not accurate, since "returned sales" appeared as purchases and "returned purchases" as sales, but it is usually accurate enough to have one sales account, the total credits being "gross sales," the debits being "returned sales" and the balance of the account "net sales." Rebates and allowances should, however, be kept in a separate account, as it is important to know how much they amount to. In the revenue account they appear as deductions from the net sales, not as charges. The same

view may be taken of "out freight"; in fact, this should be the method if part of the sales are made delivered and part not, in order to reduce them all to the same basis, it being only reasonable to assume that the gross selling price of goods delivered will be greater than the price of goods not delivered by the amount of the freight.

There are a number of ways to record the sales. The auditor should study the different methods so that he will be able to recommend the one which he considers best adapted to the particular business which he is considering. He should avoid adopting any favorite method or any special form, or he may be led to sacrifice the interests of his clients, which a little further study would enable him to conserve. If he thinks that a retail store can use a billing system both as a sales book and the debit side of a customer's ledger, he should not hesitate to recommend the purchase of the necessary billing machine, unless he can devise a method by which the same results can be reached with an ordinary typewriter or other device.

When salesmen are paid a commission on their net sales, it is necessary to keep an account with each one, showing the amount of his sales. The auditor should advise the adoption of a plan by which these records can be kept in columns, either as part of the sales book or sheet itself, or identified with it by the numbers, a column being provided for sales on which no commissions are paid, in order to get all the sales into the record. This record will then balance with the sales record and prove that all the sales made by the salesmen have been included.

106. *The practice with branches.*—When the concern has branches, the auditor should be very careful to investigate the way in which shipments to them are handled

on the books, especially where the goods are billed to the branches at anything above the actual cost. It is the practice of some houses to bill goods to their branches at the regular selling price in order to keep them in ignorance of the actual cost, or any approximation to it. As far as the sales go, they treat the branches exactly as they do any ordinary customer. If the manager of the home office wishes to make an especially good showing for the year or needs something to offset a bad state of affairs in the regular business, it is easy for him to load up the branches towards the end of the year with abnormally large stocks of goods, thus increasing his sales, his nominal profits and his assets. When goods are billed to branches at a profit the amount of all the branch inventories should be left in the sales account as an offsetting debit, when that account is covered into profit and loss account. In other words the sales to the branches as far as goods on hand there are concerned should be treated as no sales, except for the convenience of bookkeeping, and should certainly not be allowed to affect the profits of the year. The branch inventories should then be taken into the home office inventory at cost.

Where it is the practice to figure percentages on the various departments of the business, as for instance the percentage of selling expense to the total sales, the shipments to the branches should not be included in the regular sales at all but should be carried in a separate account of "sales to branches." When the goods are billed at a profit the sales account of the home office gets the benefit of them without incurring any selling expense, and the percentage of the latter to total sales is materially reduced. In a lesser degree the same is true when the goods are billed at cost. By carrying the branch in a

separate account a better idea is also obtained of the profit of the branches.

107. *Installment sales.*—When part of the goods are sold on the installment plan these sales should be kept separate from the regular sales which are made virtually on a cash basis. Strictly speaking, the difference between the installment price and the cash price should be credited to interest and it should be spread out as an earning over the life of the contract. Practically this is seldom or never done, as it is too much trouble for the advantage gained, since the excess profit in proportion to the cost of the goods sold will show the same result. The increased cost of collecting these accounts would be an offset to this extra first profit. The sales should be credited to “installment sales” and charged to “installment debtors.” In closing the books at the end of the year the whole amount of the credit to installment sales should not be credited to revenue, even if it be conceded that all the debtors are good and will eventually pay, since the expense of collecting the accounts has to be charged against the profits nominally made so far. Part of the credit to installment sales should be carried over to the next year to represent the liability for this expense and also for accounts that may prove to be bad. On the ground that in such cases, only the amount actually paid can be depended on, the credit carried over would be the same in amount as the unpaid balance to the debit of installment debtors, which would mean that each year would take credit for no profit on such sales except to the extent to which they had been paid for during the year. It would depend largely on the character of the business as to which view should be taken, one element to be considered being the value of the goods if returned through default of the purchaser.

The auditor frequently finds that full credit has been taken in the revenue accounts for sales made for future delivery. If the goods are actually on hand and the contract of sale is of such a kind that it can be sued on, and the goods are of such staple character that there is no danger of their being refused as not conforming to standard, the auditor would be justified in allowing the credit, if he was careful to see that the goods were not included in the inventory and also charged to the customer. Due allowance should be made for loss of interest if the amount is large enough to make it a matter of any consequence. But if delivery is an essential part of the contract or if there is any other element that is not absolutely fixed and determined, the sale cannot be said to be completed, and therefore no profit can be taken. Dicksee has laid down the correct principle; "the profit on the sale of goods should be taken credit for at the time when the sale actually occurs; and where it is an essential portion of the contract of sale that the goods shall not be delivered until some future date, then the actual sale would certainly appear to be at the date of delivery, and not at the date of booking the order."

108. *Two ways of treating sales.*—In the revenue account sales may be treated in either of two ways. They may be credited net to the manufacturing table and the balance of that table be brought down as manufacturing profit, or they may be omitted there and the net total of that table be charged to the trading or selling table as manufacturing cost. In the latter case the sales are credited to the trading table and the trading expenses charged against them. The net result is, of course, the same and either method may be adopted, provided the method in any particular business is the same from one year to another.

109. *Cash discount.*—Cash discount is now, almost universally, carried in a special column in the cash-book, in one of two ways, both of which illustrate the modern tendency toward greater convenience, and the saving of labor in spite of the fact that the formal rules of book-keeping may be violated. The special column is placed on the same side of the book as the item to which the discount belongs. If the principal item is entered at its face the discount column becomes an element of the cash balance, but it is temporarily, for the sake of convenience, on the wrong side, being transferred to its proper side at the end of the month. If the net cash involved is entered, the discount becomes a journal entry, pure and simple, carried on the cash-book for convenience only.

There are two reasons for either of these methods, the saving of the labor of repeating the names, whether the discount is carried on the correct side of the cash-book or is entered in the journal itself, and the bringing of the discount into close relation to the item to which it belongs. The auditor is not specially concerned with the first reason, but he is with the second, since the juxtaposition of the two items makes any manipulation of the discount much more difficult than it would be if they were on different pages or in different books.

110. *Proper treatment of cash discount in the revenue account.*—Cash discount is not usually taken into the accounts, in this country, until the actual payment is made. It is sometimes claimed that the discount on accounts still on the books should be allowed for in making up the revenue account. This is especially true in England, where conditions are much more likely to be stable than they are here and the amount of discount to be given or taken is more to be depended upon, and where also the time in which cash discount is allowed is longer than with

us. In addition to the uncertainty as to the amount, American accountants claim that the discount belongs, as an expense or an earning, in the period in which it is actually paid or received and that it should not be anticipated. The arguments for the two views are so nearly balanced that the auditor is at liberty to make up his own mind or to adopt the view taken by his client, unless there are peculiar circumstances making it untenable.

Considerable difference of opinion exists among accountants as well as merchants and manufacturers as to the proper treatment of cash discount in the revenue account. Some claim that it is a reduction in the price of the goods, and therefore deducted from purchases and sales respectively. The argument is that if goods are purchased for \$98 spot cash, they would be charged out at that price, and that there is no essential difference between that transaction and one in which goods are bought for \$100 and paid for in ten days at 2 per cent discount.

Others hold the opinion that it is an element of the financing of the business and therefore should be charged or credited in the third, or profit and loss, table as an expense or profit on the capital, like interest on bank loans. The usual reason for giving a discount is to realize quickly on sales, so that the money can be used at once in the business. This is the principal reason, as the claim that it is for the purpose of preventing the undue accumulation of accounts on the part of customers that are not thoroughly trustworthy is refuted by the fact that the untrustworthy customers seldom or never take the discount. If the business had sufficient capital to allow it to carry all its accounts for sixty days, there would be no object in offering a cash discount. This is

the case with some houses whose bills are all made at a flat rate. But, as it is the duty of capital to furnish all the money necessary to run the business to the best advantage, it is only right that it should stand the expense of providing funds through the medium of discounts, as it certainly does when it provides them through bank loans or any other financial device. In a similar way, if capital furnishes the business with sufficient funds to enable it to take advantage of discounts offered to it, capital is entitled to the credit of the profit thus effected.

Another argument for this view is that there is no accounting difference between the selling of goods on open account payable in thirty days or for a note payable in the same time. If notes were taken for all goods sold and the proposition were made to the makers of these notes offering to let them pay them in ten days at two per cent off, there would seem to be no doubt that the discount would then be treated as interest. It also sometimes happens that a merchant will raise money by selling part of his open accounts to a capitalist at two per cent off their face, in which case the discount paid would certainly be interest. Those who take the second view claim that there is no difference between selling an account to a capitalist and allowing the customer, himself to buy it before maturity as far as the disposition of the discount in the accounts is concerned.

111. *Two accounts with discount—on sales and on purchases.*—There should be two accounts kept with discount, one for “discount allowed on sales” and the other “discount taken on purchases,” as it is usually very important to know the total amount of each, which a combined account would not show. It is still more important not to combine discount with ordinary interest, as it is often essential to know how much interest is paid

out on loans from banks or others, or is realized from the loaning of idle funds. In one concern where it was necessary to carry over large sums from one season to another, the money was loaned in the idle months and the interest received was credited to a combined account of "discount and interest." The net balance of this account at the end of the year was less than \$60 debit, which made it appear as an account of very slight consequence. An analysis of it showed that it was really of great importance, as it developed that the interest received on money loaned was over \$7,000 and the discount on sales was a trifle more. The analysis was of value as the question had come up whether any appreciable amount could be saved by selling the goods net at thirty days.

112. *Cash discount and trade discount different.*—Cash discount should not be confused with trade discount. The latter is a device by which the actual price can be varied without interfering with the list price, which is often the retail price. Small fluctuations in the market can be expressed most readily in this way, and for that reason the trade discount is usually expressed in a cumulative way instead of as one rate. Small variations can be made by adding or dropping a small discount at the end. It also allows of discrimination in favor of some especially desirable customer by giving him an additional rate, without disturbing the previous rates which are given to the general trade.

Trade discount is always a deduction from the price and the net amount after it is deducted is the actual principal and is the amount taken as the face of the bill. In some lines what is really trade discount is made dependent on prompt payment, making it in a sense cash discount. The distinction that is usually made is that

cash discount is what can reasonably be considered a fair equivalent for the use of the money and that anything larger than this should be considered trade discount.

The auditor is not supposed to prove all the cash discounts or even to see that the trade discounts are properly deducted from the list prices' in every case. But he should have a knowledge of what the custom of the house is in allowing cash discounts and should scrutinize in a general way those that are shown in the cash-book to see that the bookkeeper has not run in discounts that were not really given and taken out an equivalent amount in currency. If he has any reason to suspect that this is the case he should look up the correspondence or get the original deposit ticket from the bank. The same general scrutiny should be given to accounts payable on which no discount has been taken so far as the books show.

In regard to trade discounts the auditor is not usually supposed to do much, but he should have a general knowledge of the prices of commodities so that he may detect any flagrant irregularities. It is usually taken for granted that the proper proof of payment is sufficient evidence of the correctness of a purchase account, but it may happen that the fact that a voucher is made out and paid to the right party and that it corresponds with the amount due to the party on the books and that the credit is for goods actually received and put into stock does not necessarily prove that it is correct. Some years ago a bookkeeper went to a concern from whom his house bought large bills which were for goods on which there was a trade discount of 50 per cent and asked them to bill the goods at list, saying that the head of the house had a queer notion that he would pay the list price and then take a check back for the 50 per

cent discount. As the house was a very valuable customer they agreed to do it, and the bookkeeper for several months used to bring in a check for the list price of the goods bought the previous months and would receive a check for half the amount in return. This check he used to replace currency that he had abstracted. The auditor at his regular examination noticed that no discount was taken off the bills of this particular concern and made some inquiries with regard to it, with the result that the whole scheme was discovered.

113. *Vouchers for values received.*—A voucher has been defined as a document which certifies or verifies the correctness of charges for values paid out or parted with or of credit for values received.

Taking up first the latter class, the credits for values received, the difficulty encountered by the auditor in satisfying himself of the correctness of the reported receipts is that any manipulation of the accounts in this respect would, of necessity, be in the nature of an omission of a proper credit, which is much harder to guard against than the commission of an overt fraud such as the manufacture of a false voucher for a payment. We have seen that no system of stubs or other copies of receipts given out for money taken in, is of any value unless a different person makes out the receipt from the one who receives the money. The auditor is, therefore, forced to be content with proving the accuracy of the results, as by sending statements to customers, to the best of his ability, but he should absolutely and positively insist that a system of internal checks be at once instituted, and he should put himself on record in writing that he will not otherwise be responsible for any manipulations of the cash receipts.

114. *Vouchers for payments.*—Vouchers for pay-

ments are made in many different forms, the best of them probably being the improved voucher-check on which the endorsement acts as a receipt. The invoices which are paid by the check should be identified with it, for it must not be forgotten that a voucher is not only the formal blank on which the payment is registered, but anything which "certifies or verifies the correctness of charges for values paid out," and that therefore the supporting invoices are a necessary part of the voucher. The "invoice register," "accounts payable register," or whatever else it is called, should show the manner of the payment in such a way as to identify the check. The easiest and safest way to audit them is for the auditor to check the invoices to the register, and at the same time to call the name and the check number to an assistant who will check the cash-book, calling back the amount. Incidentally the remark may be made here to apply generally to all cases, that when one person is calling amounts to another, it should always be the assistant that calls to the principal, unless they are both equally experienced.

It sometimes happens that an apparent payment has been made to a concern as proved by documentary evidence, and yet that no such money was really received. Some time ago two men who were doing a small business in the contracting and building line as partners, quarreled and employed an accountant to settle upon their respective interests. In checking up their contracts one was found that called for a house to cost \$1,600 on which was noted a payment of \$400 dated the same day as the contract, but there was no entry on the cash-book to show that the money had ever been turned into the business. When their attention was called to this circumstance they said it was all right,

that the contract was intended to be for only \$1,200, but had been made for \$1,600 to enable the owner of the property to make a larger loan from a building association. They stated, and there is abundance of other evidence to show that it was a common practice among borrowers from building and loan associations to thus make contracts that were overvalued. In examining the papers of a building and loan association the auditor would have no means of detecting such a trick, and yet its importance is shown by the fact that such fraudulent transactions were the cause of large acquisitions under foreclosure by the associations.

In such a case as this the auditor would have to be satisfied with the explanation made, provided it was corroborated by some other person than the one who received for the money.

Building and loan associations have furnished many examples of the fact that auditors cannot always depend on the true character of what are apparently perfect vouchers. In one of these associations the loans as shown by the books were certified to by a firm of public accountants and by the state examiner and yet the loan account concealed a large defalcation. This arose from the easy-going way a large number of people have of trusting implicitly to the officer of a company whom they have long known. It was discovered that many of the loans that were carried as active had been paid off long before, but the borrowers had left all the notes and other papers in the hands of the secretary without a mark on them to show that they were paid and cancelled. The auditors and the inspector, finding all the securities intact, were not to be blamed for supposing that the loans were still active, especially as the secretary had continued to make the necessary

payments with sufficient regularity to prevent any inquiry into the matter. Such carelessness on the part of the payers of the notes would seem incredible, if we did not find similar instances constantly.

In another building association case the treasurer had absconded. Accountants put to work on the books found everything apparently in good shape, with warrants all paid and nearly enough money on hand to meet the requirements of the cash-book balance. It was a mystery why the treasurer had fled until it was discovered that a large number of the warrants drawn by the secretary on the treasurer and marked "paid," had not been fully paid at all. The treasurer's plan was this: When a warrant was presented to him for, say \$250, he would tell the holder that the association was a little short of funds and that he would pay him \$50 on account, and would give him the balance when collections came in. In the meantime he would make the holder endorse the warrant in blank and surrender possession of it. He would then turn the warrant in to the secretary as paid in full and would hold the \$200 as long as he was able to pacify the creditor. By repeating the process with successive holders of warrants he was able to accumulate about \$8,000, and there is no telling how much more he would have obtained if some of the creditors had not complained to the secretary, whose inquiries caused the treasurer to abscond. An auditor could not have been blamed if he had passed the accounts as correct under these circumstances, especially as there is a grave doubt whether the warrant holders had not released the association and unknowingly accepted the personal responsibility of the treasurer.

115. *Vouchers should be required in all cases.*—If

the auditor finds that it is the custom of the cashier to give money to officers or employees without taking some kind of receipt, however informal, he should vigorously protest against the practice and if possible bring about its discontinuance. It is not necessary to have a formal receipt, as a simple debit ticket initialed by the person receiving the money is amply sufficient. The cashier who does not require some such voucher is liable to encounter serious trouble some time, and the auditor is in a position to demand that he be protected.

As journal entries can often be made to take the place of cash that is abstracted, it is as important to have vouchers for them as it is to have vouchers for cash payments, except in the case of those that cannot in any way be used to replace cash. The auditor should exercise equal care in scrutinizing them.

Every voucher should be examined to see that it is approved by the properly authorized persons, and the auditor should mark it with his initials in ink or with a rubber stamp in order that it may not be presented to him twice. This will apply with equal force to the office manager who signs checks when vouchers are presented to him. One such manager, who was in the habit of signing checks every week for a large number of freight bills to be paid in currency to a certain railroad, was always careful to have a list of the bills given to him with each check. He would check and add the list but would not mark the bills in any way. He changed his methods when a professional auditor showed him that the bookkeeper had regularly neglected to pay at least one bill each week and had presented him the omitted bills the next week for payment again, managing in this way to add about fifty dollars a week to his salary.

This leads to the remark that an auditor should call attention to any loose methods that he may notice in an office, whether he suspects that any advantage is being taken of them or not. For instance, if customers are instructed to make their checks payable to the treasurer of a company, it often happens that they make them to the order of his individual name without adding his title. The treasurer is very unwise to endorse these checks in blank unless the depositing stamp of the company has first been placed on them, because the bookkeeper can then use them for deposit to his own credit without the necessity of forging the treasurer's name.

116. *Examination of expense vouchers.*—When a column is carried in the cash-book for “expense” all vouchers for the items in that column should be carefully examined. In one instance, two checks for \$150 each were found, during an annual audit, that were made in favor of the bookkeeper and entered in the expense column. As the usual way of paying him his salary was to credit his account on the ledger, and as his entire salary had been thus credited him for the year, the auditor called the attention of the president of the company to these suspicious entries. In this case the entries were authorized and were made in this way so that other employees would not know that his salary had been increased while theirs were not. But it would have been a serious oversight on the part of the auditor if he had not noticed the items.

When vouchers are missing it is sometimes permissible to accept in their place cancelled checks received from the bank, but they are at best poor substitutes for regular vouchers.

117. *Examination of pay rolls.*—When pay rolls are to be examined by the auditor, it is manifestly im-

possible for him to verify all, or in fact any, of the signatures of the workmen. Often, indeed, the men do not sign any roll but are paid in envelopes in the presence of witnesses. It is sufficient for the purpose of the auditor if the pay roll is made up by one person, the envelopes filled by him and another, working together, and the rolls paid in the presence of a third person, usually the foreman of the whole shop or of each department in turn. Each of these persons should certify to the correctness of the roll, as far as he knows it—the roll itself and also to the fact of its having been paid. It is scarcely possible that there should be collusion between three persons. In fact, it is generally considered safe so to arrange a system that it will require collusion between two to defraud. Although it sometimes happens, it is a very rare occurrence that one man will corrupt another, largely perhaps because the corrupt man is afraid to put himself in the power of another, who may not be willing to follow him and may inform on him. In the case of the pay rolls the auditor should add them but he is very unwise if he takes any other responsibility in connection with them, except to satisfy himself that they have been made up from the time cards by one person, the rate entered and extensions checked by another, the envelopes filled by both of them, unless still a third party is available, and the actual paying off witnessed by still another. For the auditor to attempt to check back the roll to the original time cards from which it is made up, or to verify it by any other documents would take more time and incur a greater expense than his client would be willing to pay for. If he has any reason to be suspicious it would be well for him to verify a sample roll in some

such way, and if he found anything to justify his suspicions he could report it to his client, who could then order further investigation, knowing that it would be expensive.

CHAPTER XIV

CLOSING THE BOOKS

118. *The old "balance account."*—A great many persons use the expression "closing the books" without knowing that it is a survival from a time when the books were actually closed at the end of a fiscal period; and that, therefore, it represented a more complete transaction than at present, when only a few accounts are actually closed. Originally, not only were the nominal accounts closed into profit and loss, or surplus, but in addition every asset account was credited by journal entry and its amount charged to "balance account," the reverse action being taken with the liabilities. As a result every account on the books was closed, including, of course, the "balance account." The books were reopened at the beginning of the next year by another set of journal entries, the reverse of the closing entries. The closing entry, "by or to balance," therefore, meant the transfer to this balance account, and the reopening entry "to or by balance" meant the transfer back again from "balance account." In transferring accounts from an old to a new ledger it was always the custom to close the old and reopen the new ledger through the "balance account," and this is still done by some. Modern accounting is impatient with unnecessary work and has almost entirely done away with the balance account, though the auditor cannot object to it if the bookkeeper wishes to use it.

119. *Net profits distinguished from net operating*

profits.—We have seen that the nominal accounts are closed into the revenue account in the three classifications of manufacturing, trading or selling and administration or profit and loss, and that views differ as to what items should go into the first two tables. The third, or profit and loss table, represents the capital and contains all items pertaining to the current year, not directly chargeable or creditable to the manufacturing or trading processes. Such are interest, bad debts, sometimes the salaries of executive officers, and cash discount, when this is not considered a reduction of price.

The balance of this table is called the “net profits,” but it is important that it should be distinguished from the net operating profits, which was the amount brought down to this table from the trading table. The difference is that the only statement of profits that is valuable for comparison, year by year, is one that covers only those items that are common to all the years and that are necessary to the business. The classification cannot be rigidly laid down, in the same inflexible form, for all lines of business, because conditions vary, but when a classification is adopted for any one business it should be adhered to, or else all comparisons of percentages will be rendered useless.

120. *Use of percentages.*—For clearness of comprehension percentages are calculated, such as labor to material used, other manufacturing cost to material, sometimes giving the percentages on the detail of the cost. The percentage of selling expense is taken on the basis of the sales, as is also the loss from bad debts. Whether the business is a manufacturing or a trading one the percentages are valuable for the purposes of comparison, and the man who does not use them can

have but a very vague idea of the reasons for the variations in his profits from one year to another. They are valuable also for the purpose of comparing one department of a business with another, to ascertain the comparative value of the departments. They can be used to arrive at a proper idea of the value of the managers of departments by comparing the results of their work with those of their predecessors.

121. *Changes in business shown by colored lines.*—Instead of percentages recourse is sometimes had to the plan of showing the rise and fall of the total amount of business and of the increase or decrease of expenditure and profit, that is found by the use of different colored lines on a scale ruled horizontally for volume and perpendicularly for dates. When the comparison extends over several years this is the most satisfactory way of showing the results of the business, as the rise and fall of the lines is much more easily traced and understood than would be a mass of figures. These lines will show in a very forcible way the tendency of certain expenditures to keep parallel with the output, and of certain others to rise or fall in only a small degree, whatever the general course of the business may be. Labor will be one of the lines parallel with that of total business and if it falls below the parallel it will indicate that it is not paid as much in proportion to the general business as it has been previously receiving, while a contrary trend of the line will show that it is receiving an abnormally large share in comparison. In cases where the employer is satisfied that his labor is asking for unreasonable terms, an exhibit of such lines might serve as a better argument than any verbal one that could be used.

122. *Important to find causes of loss and gain.*—The

principal object of these different tables and of their correct treatment is to form a proper basis for these percentages or comparisons. It is no longer satisfactory to the manager of a business to know that he has made or lost a certain amount. He wants to know how it occurred and wishes to see whether the expenditures increase or diminish in proportion to the volume of business, with a view to finding out if possible the reason for any marked divergence from the normal. The accountant cannot usually point out the remedy for any special lessening of the normal profit, but he can show where the loss occurred, leaving to the practical managers to discover the reason and apply the remedy if possible. The cost accountant, however, often does undertake not only to locate the error but also to suggest an adequate remedy.

123. *Separate statements for departments.*—In a business that is susceptible of division into departments the revenue statement should always be made up for each department separately. In doing this there will often be some difficult questions that will have to be answered. In the case of a company running a street railroad and an electric lighting plant, there are certain expenses that manifestly belong exclusively to one or the other department and the auditor must see to it that a careful analysis is made of all the material and labor so that each is charged to the proper maintenance or operating account. But there are certain expenses that are common to both departments, notably all the power-house expense, including fuel. It is sometimes the practice to divide the operation of such a company into railway, lighting, power-house and general, but this is not at all thorough and gives little information as to the relative profitableness of the railroad and lighting

business. The auditor must know how to allocate the power-house expense between the railway and the lighting departments; and if he does not know how to do it himself he will have to consult an electrical engineer, who will tell him that the entire expense of the power-house is incurred for the sake of producing the electricity that goes over the wires to either the cars or the burners, and that the total expense must be divided between the two departments in proportion to the amount of current used by each. The auditor must therefore inspect the records of the works, or the reports sent in from there, to ascertain the number of kilowatts sent out to each department for the period, and divide the total power-house expense in accordance with these figures. The fact that he will have to learn what a kilowatt is will add interest to his work, but he must be sure that he does know, for he will find sometimes that even a high officer of a company, to whom the railway is of more importance than the lighting department, will think that the 2,000 volt lighting current should be charged at a higher rate than the 500 volts sent out to the railroad.

124. *Distribution of general expense.*—It is not so easy to distribute the general expense, which consists of office rent, salaries and expense, taxes, salaries of officers and insurance and they are usually left in a class by themselves. They are generally comparatively small by the side of the direct operating expenses.

In a department store it is sometimes attempted to divide the general expenses between the different departments, but no scheme has yet been devised that will work satisfactorily. The best way is to value the space occupied by each department according to location and square feet covered and charge a sufficient sum to each

department to make in the aggregate enough to pay for all the general expenses, such as rent or its equivalent if the building is owned, lighting, heating, elevator service, janitors, watchmen and anything else not directly chargeable to a specific department. In other words the whole business treats each department as a tenant and charges it with the rent of the space it occupies; the only difference between their relations and those of an ordinary landlord and tenant being that the rent is supposed to be based on the cost without any profit being included. In arriving at the proper sum to charge each department due allowance must be made for advantages or disadvantages of location with reference to accessibility and light, exactly as if the relation of landlord and tenant was a real and not an imaginary one.

If a proper system of keeping track of the stock on hand is in force, insurance can be divided among the departments on the basis of the values carried on the average, otherwise it would have to go into the class of general expense. It is always better to divide everything that can be divided on an equitable basis, and to make the items of general expense as small as possible, and not to use that account, as is often done, as a convenient receptacle for every expenditure that does not positively force itself into a classified account.

125. *Surplus*.—The net profit of the year is brought down into the surplus or “disposition of profit” table, to which are charged any dividends paid, and any item of expense or loss that is accidental or sporadic and does not belong exclusively to the current year; profits of a similar nature being credited to it.

Surplus is one accounting term about which there should be no ambiguity, as it can mean only one thing,

that is, the excess of the assets over the liabilities, including in the latter term the capital stock. It does not make any difference how this excess is brought about. It may be by the gradual growth of the operating profits, when the dividends, if any are paid, are less than the profits made. It may be by an accidental or unforeseen increase in value, which might be very large, as in the case of mining stock which was taken over at ten cents a share from a customer whose account was considered worthless and which eventually sold at \$5 per share. It may be from the donation of land to a factory, which land becomes the property of the company when certain conditions have been fulfilled. Whatever the source, it is a legitimate surplus if it represents realized value. Therefore, there is no occasion for setting up on the books any such account as "special surplus." For the information of stockholders, it is allowable, as we have seen, to show the total surplus on the balance sheet in two or more subdivisions, as "appropriated surplus and free surplus," as an indication that part of the surplus heretofore accumulated has been invested in or appropriated to the purchase of some fixed asset, whether that investment be in sinking fund bonds, new plant or any other thing which is not readily realizable in cash. But the different divisions of the surplus should be added together so as to show the total surplus, as in no other way can be shown the true condition of the accumulated undivided profits to date. It is not necessary to open accounts on the books with these divisions of the surplus account, especially when the investments are plainly shown on the asset side.

It must not be forgotten that there is a distinct difference between the functions of the profit and loss ac-

count and the surplus. Into profit and loss are closed all the operations of the year, pertaining to the regular and ordinary business of the year. If extraordinary and accidental items are put into this account, the basis of comparisons with other years is thrown out of proportion, and for this reason all such items must go directly into surplus.

126. *What is a profit?*—As a rule, there can be no profit except on a completed transaction, but sometimes an apparent profit from a bookkeeping standpoint may not be a real one from the standpoint of the auditor. An instance of this was seen in a statement made by a street railway to prospective purchasers of the entire stock, showing net earnings of 8 per cent per annum for nearly two years. The statement was made by the secretary as a correct copy of the books. The intending purchasers sent a professional auditor to verify the statement, which was found to be absolutely correct as far as the books were concerned. But there was an item of \$50,000 credited to profits, which arose from the purchase for \$50,000 of stock for the face value of \$100,000 from a man who had received it at the time of the merger of three companies into the present one. The face of the stock was charged to capital stock account and the question was what to do with the \$50,000 difference between that and the cash paid. This question the secretary answered by crediting it to profit and loss, and what was worse, he included it in the gross earnings in his statement. He was perfectly honest about it and was very angry when the auditor threw it out as not being a profit at all, but a lessening of the water in the stock, as the road had been, as usual, purchased entirely with the bonds, the stock being represented by a purely fictitious debit to plant and franchise

account. The credit should, of course, have been to the latter account. Even granting that the good-will of the franchise was worth the whole of the capital stock, and that in consequence the item could be considered a legitimate profit, it was in no sense an operating profit; it had no place in a statement of earnings which was to be submitted to prospective buyers as a proof of the earning power of the stock. There were other errors in the statement arising from the omission of accrued bond interest and other liabilities not yet due and, therefore, not on the books, the total errors bringing the true earnings down below 3 per cent per annum.

127. *The test of a profit.*—One crucial test of a profit is that it adds actual value to the business, value that can be realized. As many of the items which enter into the calculation, such as the amounts necessary for the establishment of proper reserves, are not matters of absolute fact, but are based on the best judgment of those that know most about them, it follows that any statement of profits is at best only an estimate. All that can be said, therefore, in regard to the profits shown by a revenue account is that they are correct, if the estimates of depreciation, of reserve for bad debts and other things affecting the value of the assets are also correct. No profit can be more definitely stated until the business is actually wound up and all the assets realized in cash. In preparing a revenue account and the resulting balance sheet the auditor is expressing an opinion and is not registering facts.

But in expressing this opinion, the auditor must be sure that he has properly investigated all the steps leading to it, that he has properly distinguished between the expenditures that are purely for the maintenance

of a plant and those which are actual additions to its value, and has not allowed credits for profits that are not really made, however plausible may be the reasoning in regard to them.

An instance of this latter error is found in the claim that is sometimes made that because the interest paid on borrowed money employed in development work is properly chargeable to development cost, therefore interest could be paid to stockholders and charged in the same way. This is manifestly a pure subterfuge by means of which to pay out a profit that was not really earned. It is questionable whether a board of directors who authorized it could not be made personally responsible to subsequent stockholders for the amounts thus paid out.

128. *Capital expenditures and revenue expenditures.*—The auditor should have a clear idea of the difference between capital expenditures and revenue expenditures. Those things that can be reasonably added to the original investment of capital as capital expenditures instead of being charged against profits are:

Actual additions to property in the shape of new buildings, new machinery and new tools, not replacing old ones of the same character.

Replacement of old assets by new ones of higher cost, the difference in cost being chargeable as a capital expenditure.

Such alterations to fixed assets as result in greater efficiency in the way of increased output, may be charged, in part, as an investment of capital, as may also such alterations as result in a diminished operating cost. But in both these cases it is better to recognize the real nature of the expenditure as a means of adding to the profits

of future years and carry them as deferred charges in some such account as "betterments" to be gradually written off out of the profits they will cause.

Even when the expenditures are so extensive that they amount to the rebuilding of a plant in order to modernize it, they should not be added to the value of the fixed assets already on the books, as permanent capital assets.

It must be understood that when ample reserves have been maintained for the depreciation of the old fixed assets, so that these old assets are virtually not on the books at all, the replacing assets can be charged as investments, while the old assets are charged off against the reserve accounts established to provide for that very purpose. All the auditor is concerned about is to be sure that the amount at which the fixed asset is carried is not greater than its real value to the business as a growing concern.

Ordinary repairs and replacements are, of course, chargeable, as revenue expenditures, to profit and loss.

If a sale is made of an asset against which a depreciation reserve has been set up, the proper entries to be made would be to credit the original cost to the asset account, to charge the reserve with the amount with which it has been credited for that particular asset and to adjust the difference between this net carrying value and the price realized, by a charge or credit to surplus. That is, if a machine costing \$1,000 originally has been depreciated 10 per cent per annum for two years, its carrying value would be \$810. If it is now sold for \$700, machinery account should be credited \$1,000, depreciation reserve charged \$190 and surplus charged \$110. The charge is to surplus because the loss belongs to the whole period and not to the current year.

CHAPTER XV

DIVIDENDS

129. *Dividends payable from surplus.*—When the profits of the year have been ascertained and carried to the surplus account, the question arises whether that account will permit the paying of a dividend. It is, of course, understood that no dividend can be declared in an incorporated company, and no money drawn out in an ordinary partnership unless there are legitimate profits actually made to a sufficient extent to cover the proposed dividend. If the profits are not sufficient the company will be paying the dividend out of capital, which practice is absolutely wrong, or the partners will be withdrawing part of their capital, which they have a right to do provided they make the entries so as to show the payment as a withdrawal of capital and not as a dividend from earnings.

130. *Close scrutiny of the balance sheet necessary.*—In determining the right to declare a dividend it is necessary to examine the balance sheet to see whether there are any items in it that should be written off from the assets, or any omitted from it that should be added as liabilities for reserves against bad debts or wasting assets. It has been held, however, that it is not necessary to make good all the assets, in order to declare a dividend. For instance, if the development expense is still carried on the books as an asset it is not imperative that it shall be written off before a dividend is paid, provided

a reasonable portion of it is cancelled and the course of the business justifies the carrying of the remainder as an asset in the nature of good-will. If proper reserves have been established or the corresponding amount of depreciation has been charged and there is a sufficient balance in the undivided profit account, the advisability of declaring a dividend is left entirely to the board of directors. But if they declare a dividend which acts as an impairment of the capital they may be held individually liable for having done so, therefore, the auditor should satisfy himself that the dividend is a proper one, and if he is convinced that it is not, he should call the attention of the directors to the risk they run in declaring, and paying it.

131. *The right to declare a dividend not dependent on cash balance.*—The auditor will frequently find that the officers of a company are under the impression that they cannot declare a dividend unless the company has at the time an available cash balance with which to pay it. In a large company where the stock is scattered and the money will be at once demanded this is undoubtedly true, but in a smaller concern there are frequently one or more of the principal stockholders who will be willing to have the dividend credited to their accounts to be drawn as they need it when the company is in funds, or it may be that they already have debit balances which the dividend will not much more than cover. Sometimes the dividend is paid in scrip which bears interest and is negotiable, so that those who need the money can sell the scrip and realize whatever it may be worth on the market. The company will take up the scrip whenever it is in funds and is sometimes able to buy it up at a discount. Or it may be exchanged for bonds or for shares of stock, in case it is desirable to increase the cap-

ital. Sometimes the dividend is originally in the form of new capital stock shares. This action fixes the active capital in the business in a more permanent form, taking it out of the power of the board of directors to dissipate the surplus by paying it out in cash dividends.

132. *The obligation to declare dividends.*—A board of directors is not obliged to declare a dividend, although there may be profits enough to declare it out of any funds on hand sufficient to pay it, unless it can be shown that the directors refrain from such action for some other purpose than the strengthening of the position of the company. The board might pass dividends for the purpose of depressing the stock and of tiring out stockholders who needed the income and could be induced to sell at a low price in order to invest in something that would give them present returns. If such a case or a similar one can be made out, a court could compel the directors to declare a reasonable dividend.

133. *Rights of subscribers who have not paid in full.*—Subscribers for stock who have not paid for it in full are not usually entitled to participate in dividends, except where all the stockholders are on the same basis as to partial payments, in which case the dividends should be credited to the stock accounts of the subscribers and not paid in cash. If this should result in too great an accumulation of money in the treasury of the company the best way to reduce the cash balance would be to buy in some of the stock and cancel it or place it in the hands of a trustee. There is, however, no obligation to credit the dividends to the unpaid stock accounts if the stockholders are willing to carry the liability on the unpaid subscriptions, and the company has sufficient funds on hand to pay it.

A dividend is usually declared at so much per cent on

the capital, but it is sometimes said to be for a specified sum per share.

134. *Rights of preferred and common stockholders.*—Dividends on preferred stock take precedence of those on common stock. Preferred stock is a special stock on which a specific dividend is guaranteed. It is sometimes cumulative, which means that if the guaranteed dividend is not made in one year the guarantee continues over into subsequent years until the entire preference dividend has been paid for all the years. It must be understood that the guarantee is limited by the ability of the company to pay the dividend out of actual earnings and in that respect differs from the interest on bonded indebtedness, which is a preferred debt whether it is earned or not. Preferred stock cannot demand a dividend unless it can be shown that it is actually earned. If the dividend is non-cumulative each year stands on its own basis, so that if the business is sufficiently prosperous in any one year to pay the preference dividend for that year and leave a surplus, that surplus can be paid to the common stockholders as a dividend, regardless of the fact that for one or more years in the past the preferred stock has received no dividend. While the preferred stock is entitled to the first dividend up to the fixed rate, it is not entitled to any more, however much there may be to divide, unless there is a specific agreement, as there sometimes is, that whenever the profits are sufficient to pay more than the fixed rate to both classes of stock, they shall both share equally. Usually after the given rate has been paid the balance of the profits belong to the common stock, so that in a very prosperous company the common stock may receive very much larger dividends than the preferred and be by that much the more valuable.

135. *Present method of paying dividends.*—In paying dividends it used to be the custom to list the stockholders in a special dividend book showing the number of shares held by each and the dividend to which each was entitled, with a place for his signature receipting for the dividend. In this case “dividend” was credited and “surplus” charged at the time the dividend was declared. As the stockholders came in and drew their money, dividend was charged, the balance of the account being a credit to “unpaid dividends.” As companies grew larger and as their stockholders became so scattered that it was impossible for them all to call at the office of the company and sign receipts, this method was almost entirely given up, and the usual custom now is to make out checks for all the stockholders at once and mail them on the day the dividend is payable. The checks are usually on a special form so that the endorsement acts as a receipt for the specific dividend. In this case the total amount of the checks to stockholders in payment of dividends is charged to “dividend account,” which is eventually charged to surplus and there is never any credit to unpaid dividends.

As capital stock is transferable only on the books of the company, the dividend is payable to the person whose name appears on the books as the owner, who is called the “holder of record.” In order to prevent confusion in case of transfers occurring after the checks are made out, it is the custom to close the transfer books a few days before the dividend is payable, and to reopen them the day after the payment. In this way the holders of record cannot change for a limited time, allowing time enough to make out the checks. If any stock is sold during the closed time it is said to be ex-dividend, as the seller, being the holder of record, will receive the check

for the dividend, although at the time he gets it he will not be the actual owner of the stock.

136. *Dividends depend on assets.*—The word dividend means the thing to be divided, and in this sense is applied to the partial payments made to creditors in liquidating a bankrupt concern and to stockholders and partners in winding up a business. It has nothing to do with profits, but is concerned only with the assets, which may not necessarily be all cash, if one or more of the parties is willing to take property of any kind, at an agreed valuation. It may happen in a partnership liquidation that there are more assets than are sufficient to pay all the liabilities and the partners' capital. The excess must be profits, which would then be divided between the partners on the agreed profit-sharing basis and not on the basis of capital, if there were any difference between the two rates.

137. *Proper procedure in a partnership.*—An auditor should thoroughly understand the principles governing the making of liquidating dividends to partners who share profits and losses in a ratio different from that of their capitals. The rule ordinarily given for the settlement of partnership affairs is to pay outside creditors first, then any loans made by one or more partners to the business, then to repay the partners' capital proportionately and if there is anything left to divide it among the partners on the profit-sharing basis. But this rule cannot be rigidly adhered to in all cases. The proper procedure, after paying off the outside creditors, is to ascertain the condition of the capital accounts by determining the loss if any, and charging it against the capital accounts, and then to make the division on the basis of the amended capitals. It is a dictum of ordinary common sense that if the capital of one of the partners

now appears as overdrawn the deficit must be made good out of his loan to the company if he has one, in spite of the rule that loans by partners shall be paid before any further division.

138. *Payment of liquidating dividends—illustration.*
 —If the entire loss is known when the division is begun there is no danger in paying liquidating dividends as fast as assets are realized. But if the assets are such that there may be further considerable losses the liquidator runs a risk of overpaying one of the partners whose percentage of profit, and, therefore, of loss, is greater than the others in proportion to his capital. The only way to make this clear is by an illustration. Suppose A, B and C have \$9,000 each to the credit of their capital accounts, but that they divide profits on the basis of 50, 30 and 20 per cent respectively. They make a loss of \$9,000 and agree to liquidate. Collections to the extent of \$9,000 are made and divided between them. The situation would then be as follows, if the money collected is divided on the basis of the capital standing to the credit of each:

	Total	A.	B.	C.
Capital	\$27,000	\$9,000	\$9,000	\$9,000
Loss	9,000	4,500	2,700	1,800
	<hr/>	<hr/>	<hr/>	<hr/>
New Capital.....	18,000	4,500	6,300	7,200
Dividend	9,000	2,250	3,150	3,600
	<hr/>	<hr/>	<hr/>	<hr/>
New Capital	9,000	2,250	3,150	3,600

If the remaining \$9,000 were paid, the division would give each man the amount standing at his credit and there would be no trouble. But if there is a further loss, say of \$6,000, it would have to be divided on the basis of 50, 30 and 20 per cent and \$3,000 of it would be chargeable to A, who is, therefore, overpaid \$750.

If the final outcome of the liquidation, therefore, is un-

certain, the only safe plan for the liquidator to adopt, other than refusal to make any distribution until the fate of all the assets is definitely known, is to apply the first payments in such a way as will bring the respective capitals to the same proportion as the loss-sharing ratio. In the example stated, B would be given \$3,600 and C \$5,400 of the \$9,000 dividend. The capitals would then stand A, \$4,500, or 50 per cent; B, \$2,700, or 30 per cent; and C, \$1,800, or 20 per cent of the remaining \$9,000. Whether any part, or all of the residue should prove either good or bad, the division of either loss or dividend would be at the same ratio and there would be no danger of overpayment to anyone.

It has been claimed by some that since the firm is in liquidation, the provision as to profit-sharing ratio is abrogated and does not apply to the losses, but there does not seem to be any authority for this view. Although these are called losses of liquidation, they are not really such, since the items on which the losses occur were acquired while the business was a going one, and any quality in them which would lead to loss must have been inherent from the beginning. While the loss was developed by the liquidation, or discovered in the process of it, it was really always there, although latent or temporarily obscured.

139. *Principal and income.*—In connection with the topic of profits a very interesting phase of the subject is found in the determination of what constitutes income and what is an addition to principal. More often than anywhere else, this occurs in cases in the probate court, where it is necessary to construe the terms of a will by which the income of an estate has been left to one person during his life, and the principal of the estate (called the corpus) to another person called the remainderman.

It will be seen at once that there are here two conflicting interests, and that if money is paid to the holder of the life interest, as income, which is in reality an addition to the value of the estate, or which diminishes the amount to be given to the remainderman, when the life interest terminates, the remainderman will have a claim against the trustees of the estate. On the other hand the holder of the life interest will naturally claim everything as income that can possibly be construed to be such.

The auditor is frequently asked to determine this question, but unless the matter is very plain, he will seldom be able to do more than give his opinion and the reasons for it. The only safe plan for the trustee to follow is to refer the matter to the court and get positive instructions. In some cases there is little or no doubt of the true position.

140. *Profits from stock or bond sales.*—Profits on sales of bonds or stock originally held by the estate, at prices above those at which they were inventoried are additions to principal, and not income. Conversely, losses on such sales are chargeable to principal. If, however, the bonds or stock were investments made by the trustee himself, it is a question whether profits on them should be added to the principal or treated as an income from trading by the trustee. The bulk of expert opinion is rather in favor of adding them to the principal, as they result from a change of assets and are not a regular income from them.

141. *Case of a wasting estate.*—In the case of wasting principal, as in a mine, the trustee who is directed to pay the income to a life-tenant would not be justified in considering all the dividends received as income. He must provide for the wasting of the corpus or principal, so that he can turn over to the remainderman an equiv-

alent for the reduction in value of the stock in the mine consequent on the exhaustion of the ore. The testator may have been in the habit during his life of calling all receipts from this source income, but unless the will is very explicit in directing that all receipts are to be paid to the life-tenant, the trustee would be bound to protect the interests of the remainderman, and an auditor should advise him to retain and reinvest a certain portion of the so-called income as an offset to the waste of the principal. It may be that the company declaring the dividend may have made such provision itself by means of a sinking fund or otherwise, in which case the trustee would be justified in regarding all the money received from dividends as income.

Bond premiums are in the nature of a wasting asset, whether they are on bonds received at market value in the original inventory or purchased above par by the trustee himself. Different courts have decided differently on this point, but it would seem as if the only just method was to calculate the interest at the basic rate on the total cost of the bonds and to retain and reinvest the difference for the benefit of the remainderman.

142. *Taxes and improvements.*—Taxes assessed against the estate before the death of the testator, though not payable until afterwards, are a charge against the principal, as are, also, all debts due by the testator himself, including funeral expenses, and all legal and other expenses arising from a contest of the will, or incurred in defending the estate against claims dating from before the death of the testator.

Alterations and additions to property increasing its value are a charge against the property and, therefore, the principal of the estate, but, of course, ordinary repairs and maintenance must be paid out of the income.

Expense on unimproved land, including the taxes, would always be a charge against principal, on the ground that there is no income from such property out of which to pay them, and also that such expense is incurred with the expectation that the value of the land will correspondingly increase to the eventual benefit of the principal.

143. *Contracts of a testator.*—Contracts: A leading authority says that “the trustees must carry out any contracts entered into by a testator prior to his death, and any profits resulting therefrom will belong to the principal and not to income.” It would seem more equitable, however, to allow the life-tenant such a portion of the profit as the proportion of the work done subsequent to the death of the testator bears to the whole profit, thus indicating the profit of the period during which the life-tenant had an interest in the income of the estate. Otherwise, the trustee would be using money to complete the contract, for the sole benefit of the remainderman, which should have been made to produce income for the life-tenant.

The expense of managing and carrying on a trust constituted by a will is chargeable against the income, including the trustee’s fees and legal and other expenses necessary to the proper management.

144. *Income accruing from day to day.*—Those classes of income which accrue from day to day are to be credited to the principal of the estate up to the date of the death of the testator, that is to say, all that is then accrued. These are rents, interest on notes receivable and on bonds. In this matter the auditor must be careful not to follow British authorities, for courts in Great Britain have ruled that each coupon on the bond constitutes a separate contract to pay a definite sum at a cer-

tain time and that it belongs to the period in which it is due. A similar decision was given by Massachusetts courts. On the other hand, it is the law in England that when a dividend on stock is paid to an executor covering a period part of which is prior to the death of the testator, he must apportion it between principal and income on the basis of the lapsed time. It is important to note that this division is not made until after the dividend is paid, while accrued rents and interest are inventoried at once. In this country it is generally considered that ordinary dividends on stock do not accrue from day to day and have no existence until they are declared, and it is customary to regard the whole dividend as belonging to the period in which it is declared. This arises from the uncertainty as to when the profits are made, since there are very few concerns whose business is so steady and uniform that they may be considered to be making one-fifty-second or one-twelfth of their yearly profits each week or month. This idea has been made to include cumulative preferred dividends, although the reasoning is not as good in regard to them, and it is doubtful whether the courts would uphold it if it were brought before them.

145. *Ordinary dividends treated as income.*—It is a very difficult thing to hold the scales theoretically in balance in dividing dividends between principal and income. If the company declaring the dividend has made only 6 per cent in the period covered and yet declares and pays a dividend of 10 per cent, it is manifest that 4 per cent has been taken from the old surplus, and to that extent the value of the stock has been depleted. While it is true that the undivided surplus of a corporation is not the property of the stockholders and that they have no claim on it until a dividend is declared out

of it, it is equally true that its existence enhances the value of the stock, and that the remainderman has a right to claim that the asset to which he has an eventual title shall not be diminished below the value that it had when it came into the hands of the trustee. On the other hand, he has no right to have it increased, as would be the case if the supposed conditions were reversed and the dividend were only 6 per cent, although the earnings were 10 per cent. As this question is too complicated for the ordinary person to understand, the universal custom is to treat ordinary dividends as income.

146. *Extraordinary cash dividends.*—In the case of extraordinary cash dividends or of stock dividends, the amounts involved are often too large to allow the true principle to be ignored. In one instance an estate held stock whose face value was \$15,000, the book value being very much greater. In anticipation of a reorganization and combination with other companies a cash dividend of \$60,000 was paid and in the transfer to the merger company a further cash payment of \$37,500 was received and the \$15,000 stock was taken up with \$37,500 of the stock of the merger company. The trustee had received \$97,500 in cash and \$22,500 in stock, which was manifestly not to be considered as income, as would be the case if the rule was rigidly enforced that dividends belong to the period in which they are declared. Cases similar to this have been decided differently by different courts. A decision by the United States Supreme Court says:

Reserved and accumulated earnings, so long as they are held and invested by the corporation, being part of its corporate property, it follows that the interest therein, represented by each share, is capital and not income of that share, as between the

life-tenant and the remainderman. A stock dividend really takes nothing from the corporation and adds nothing to the interests of the shareholders. After such dividend, as before, the corporation has the title in all its corporate property, the aggregate interests therein of all the shareholders are represented by the whole number of shares, and the proportionate interest of each shareholder remains the same.

However, a New York decision, rendered after the above, says:

When a stock dividend declared by a corporation and allotted to shares of its original capital stock, belonging to a testamentary trust estate, constitutes as a matter of fact a distribution of accumulated earnings or profits, it represents income and belongs to the life-tenant of the trust estate as between him and the remainderman.

This difference of opinion was shown in a marked degree in two cases regarding the same dividend. One estate holding some of the stock was in Massachusetts, where the dividend was decided to be income, and the other was in Connecticut, where the same dividend was held to be capital.

The principle adopted in the leading case in Pennsylvania would probably appear to the accountant to be the only equitable one. It is that the value of the stock when it came into the hands of the trustee should be established, and that this value should be maintained. Therefore, any stock dividends or extraordinary cash dividends would be given to the life-tenant as income, only after enough had been reserved for the benefit of the remainderman to restore the capital of the latter to its original status. In this way the rights of both parties would be conserved. To give all the extraordinary dividends to the principal would scarcely be just if sev-

eral years had elapsed since the stock came into the hands of the trustee, if during those years the ordinary dividends had been less than the real earnings of the company.

Under these circumstances it must be apparent to the auditor that his only safe course is to advise his client to apply to the court for instructions.

There are occasions, however, on which his advice may be given after he has formed his own opinion. Where the stock is carried as an asset by a company which is the auditor's client, the board of directors may wish to consider all the dividend as earnings and themselves to declare an excessive dividend on the strength of it. The auditor should certainly object to this action, if the book-value of the stock has been reduced below the amount at which it is carried on the books. Enough of the dividend should be credited to the account of the stock to reduce the carrying value to its real value. This would apply also to an ordinary dividend which is greater than the actual earnings for the period which it covers. Conversely, if the dividend is less than the actual earnings, there would be established a secret reserve, unless the carrying value were brought up to the new book-value. There is, however, so strong an objection to writing up an asset, and crediting surplus with an unrealized profit that it would be advisable to credit the increased valuation to "contingent stock profit," or not to write up the asset at all, but to show the book-value in parenthesis on the balance sheet.

147. *Confusion as to the meaning of "income."*—The confusion in these cases arises very largely from a similar confusion in the mind of the ordinary business man between income and expense, and receipts and disbursements. It is very difficult sometimes to explain to such

a man that he may have income that is not a receipt, or an expense that is not represented by a disbursement. The ordinary man wants to know how much money he has received and how much expended. He has been used to dealing with cash and has grown to think that the money involved is the all-important thing. Hence all the money he receives above the face of his asset is income to him, and nothing else is.

Income is necessarily only what constitutes a clear gain in value, whether received in cash, at present, or to be received in the future, provided its eventual receipt is, humanly speaking, certain, and that in the meantime it is in such shape that it can be carried as an asset. In that way the profit on goods sold is an income, although for the time being it is included in the accounts due from customers. If the ordinary testator had a clear idea of these matters he would be more apt to word his will so that there would be no doubt in the mind of the executor or trustee as to his real intentions. In the last analysis it is always the intent of the testator that must govern the decision, even of the court.

If attorneys who draw up wills would thoroughly acquaint themselves with the accounting principles involved, or would consult competent accountants in regard to them, they would be able to give testators advice which would prevent many disagreeable misconceptions. In the discussions preceding the passage of the Federal Corporation Tax law, it was made very evident that even when an attorney was eminent enough to be Attorney General of the United States he did not necessarily have a very clear idea of what constitutes income.

CHAPTER XVI

CONDUCTING AN AUDIT

148. *Attitude of the auditor toward employer.*—In taking up the proper way in which to conduct an audit, one of the first points to be considered is the attitude of the auditor toward the office whose accounts he is examining. It is a little difficult to describe the exact position he should take. He must avoid placing himself on the footing of a clerk with the head of the office, but must preserve his complete independence, while at the same time he must be careful not to arouse antagonism by too great an assertiveness. He must be willing to give way in all minor things, where no principle is involved, in order to make more effective his positive stand for his own opinion when an important point is under consideration, and he feels that it is essential to honest work that his advice should be followed.

Many office managers have little pet ideas of their own as to how certain things should be handled. The ideas may not be the best in the world, but the manager thinks they are, and if you contest them, he gets a notion that you are trying to upset the whole routine of the office, and a feeling of antagonism is aroused that makes it difficult to carry out any reform whatever. It is not often that the auditor is given a free hand to make any changes that he may see fit. He is more often obliged to use tact in bringing about the improvements that he desires to introduce.

When he has been the regular auditor of the house

for any considerable time, he should have gained the confidence of his clients sufficiently to be able to demand and to receive absolute authority to make any changes that he considers necessary, but he is seldom in that position at the beginning of his experience with any individual concern. When he has established himself on the right footing he will become the confidential adviser of the manager and will be consulted on many important points that are vital to the success of the business. For this reason it is poor policy for a house to be always changing its auditors, since no one of them can become thoroughly conversant with the business and its history.

As an aid to the better acquaintance between the auditor and the business manager the frequent audit is preferable to the annual one. When a whole year intervenes between two visits of the auditor, the conditions of the business cannot be as fresh in his mind as when the interval is only a quarter of that time. The frequent visits of the auditor allow more opportunities for the discussion of points that arise, and offer a greater chance for the cultivation of the friendly feeling that should characterize the relations between the two men.

No manager likes to have any more outsiders cognizant of the details of his business than are absolutely necessary. It is advisable, therefore, to send the same assistants each time when possible, and there is no objection to this if the chief auditor keeps sufficient watch over the progress of the work to see that his men are not falling into ruts or overlooking anything that is of importance.

149. *Relations with the clerical force.*—In his relations with the clerical force the auditor should be firm but not harsh. While he is, of course, absolutely independent of any of the employees, it is never advisable to

incur their ill-will by a dictatorial manner or by a parade of authority. He should make it very plain to every one in the office that he is willing to help by advice in every way possible, when asked to do so, and should impress upon them the idea that his object in any changes he may suggest is either to lessen the work or to improve its quality. While treating the members of the office force with due courtesy, he should never become chummy with them or allow them to pass beyond the strictly business relations which should characterize the intercourse. If he is employing assistants on the work he should warn them against cultivating more than an ordinary friendly feeling between themselves and the employees. In arranging the details of the audit he should try as far as possible to use the various books at the time most convenient to the men who keep them, so as to interfere as little as possible with the routine work of the office. By the exercise of a little judgment it is easy to work on the book that may happen to be idle at the time. When the office sees that he is willing to do this they will be glad to accommodate him when it becomes necessary to interrupt the current work to a certain extent. But while thus willing to accommodate himself to the routine work as far as possible, he must have it distinctly understood that he, alone controls the situation, and that he can take possession of any book at any time that he thinks necessary.

In a new audit he will probably be offered a great many suggestions about the best way to handle that particular set of books. He should thank the friendly adviser and then quietly go to work in his own way. It will not take him long to unravel the intricacies of even the most complicated system, though he will occasionally find some whose vagaries will need careful study.

He may encounter bookkeepers who will object to the point of absolute refusal to make changes that he requires. His only recourse then is to handle the matter without gloves and fall back on the authority of the head of the office and demand that the desired move be made at once and without reserve.

150. *Method of conducting the first audit.*—In the first audit for a new client the auditor should thoroughly study the system in use in the office, so as to acquaint himself with the books that it will be necessary for him to examine. If there are many of them he should make a list of them. It sometimes happens that the bookkeeper forgets to give him one or more books that are not often used, or it may be that the bookkeeper is absent for one reason or another, and that there is no one thoroughly posted in regard to all the books. The absence of one or more books will be discovered from the fact that there are postings to the ledger account that are not traceable to the books in hand and must, therefore, have come from books not yet in evidence. The auditor should study the methods in force of obtaining and recording the information in regard to the daily transactions of the business, the manner in which it is treated after being obtained, the safeguards that are provided against innocent or intentional error, the system adopted for keeping account of stock, and the general features of a cost system, if one is carried on, and the way in which all the underlying work fits into the general scheme of the accounts. He should also familiarize himself in a general way with the character of the business, the nature of the articles manufactured or dealt in, and with any peculiarities in the customs prevalent in that particular line, such as the usual trade and cash discounts, and the usual time allowed to customers in that trade.

With the whole course of the business thus thoroughly understood, a definite plan can be adopted, subject to any modifications that may be caused by the later discovery of details that it may be considered necessary to investigate. The principal having thus acquainted himself with the work to be done, can give verbal or written instructions to his assistants who do the actual work, and he can be in a position to supervise it intelligently, either in personal visits to the office where the work is being done, or by scrutinizing the papers brought to him from time to time, or at the close of the audit, and will be able to give advice if it is needed at any time. It may be that the senior accountant is a man who can be entrusted with the entire work, including the mapping out of the entire scheme. Such a man, however, would virtually rank as a principal.

In a periodical audit, after the first one, all this information would be in possession of the auditor, and it would be necessary only to refer to the previous audit and from it make up a schedule of the work to be done, not only for the guidance of the assistants, but to prevent the accidental omission of any part of the audit. As a further check on this, it is customary for each person on the work to make reports on either daily or weekly sheets, detailing the kind of work done and the number of hours consumed in it. In the auditor's office these reports are posted to contract sheets which will eventually show the total time consumed, from which the cost can be calculated and the account made up against the client, if the work is being done on a per-diem basis. In any event, the information in regard to the time is valuable in estimating on future work of the same general nature.

The schedule of work to be done on an audit would be made up by each auditor in accordance

with his own ideas. Naturally, the first instruction would be to verify the cash, unless the custom of the office was to deposit all receipts, in which case there would be no cash to verify, except the petty cash. Some auditors insist that all the additions in the cash-book must be proved, while others content themselves by making copious tests. The principles governing the audit of each item of the accounts have been discussed under their respective headings. No inflexible rules can be laid down as to the order in which these items shall be taken up in an audit, nor how much investigation shall be given to each. Only one thing must be insisted on; the auditor must treat each department of the work with sufficient thoroughness to satisfy himself that he has not omitted anything of importance, nor neglected to notice any unusual payment or receipt that should have been investigated. Above all, he should not unduly curtail an audit because he has made a flat bid that will not pay him if he does thorough work.

151. *Field notes.*—For the double purpose of giving the principal the desired information and of preserving data that will support the tables contained in the report, it is now the custom of many auditors to make abstracts of the accounts on their own paper instead of checking the books. This paper is provided with a number of debit and credit columns. Each set of columns is headed with the name of an account in the general ledger. In order to save time in looking for an account, as well as to condense the work on as few sheets as possible, it is well to block out the sheets in advance by running through the ledger, so as to get the accounts on the sheets in the same order as in the ledger, and to allot each account just about the space it will occupy. The

posting-folio reference will then be a guide as to the position of the accounts on the sheets, but postings to the sheets must be by names of the accounts and not by page numbers. Each item in the books of original entry is posted to its proper column on these sheets, except that accounts receivable, and payable are treated by totals only and not in detail. When columnar books are used only the totals of the columns are posted. When all the items are posted and the columns added, the starting trial balance is spread on a trial balance sheet in the first two columns, the debit and credit totals for each account taken from the analytical columns are placed in the second two columns, and the resultant trial balance in the third set of columns. This trial balance is then compared with the balances on the ledger and any discrepancies that may be found are investigated and adjusted. This makes a much safer audit than does the checking method, as even the most careful auditor is liable to follow the posting and repeat an erroneous one by inadvertence.

For instance, an item of \$150, consisting of a dividend received by a certain company on an outside investment, was posted by the bookkeeper to insurance on page 28 instead of to interest on page 26. The auditor in checking the accounts, saw that the item was posted to page 28 and checked it to that page, without noticing the name of the account. It was unquestionably a careless thing to do, but even the best men sometimes grow careless when doing purely routine work like checking. The error was not discovered until some time after he had rendered his report, and when his attention was called to it he could do nothing but acknowledge his blunder and resolve that in future he would always adopt the analytical method, which would have detected

the error, since attention would be paid then only to the name of the account, and not to the number of the folio. The certainty of this process offsets the slight increase of labor and time necessary to carry it out, and it has the advantage of doing away with the necessity of making check marks on the books, a practice to which some bookkeepers strenuously object, and the further advantage of furnishing the auditor with a complete abstract of the books for his office files.

In the ordinary way of checking the accounts to the ledger and then taking a trial balance, or checking to the one prepared by the bookkeeper and copying it, the same schedules could be made up, but there is nothing in the possession of the auditor that would substantiate them.

In abstracting, the usual method is to begin with the cash-book. When all the items have been posted from that to the abstract sheets, including the total cash receipts and disbursements, a summary is made of the total debits and credits. If it balances it is not necessary to add the cash-book, except as to the columns whose totals only have been taken. Under the cash-book postings on the abstract sheets are now posted the entries from all the journals, and the totals are then transferred to the second set of columns on the trial balance sheet. These columns must, of course, balance, as must the resulting trial balance in the third set of columns. If the books are to be closed, the profit and loss items are put in the fourth set of columns by crediting the expense accounts and debiting the profit accounts, the balance of net profits being put in red ink. By adding and deducting from the last trial balance in the third set of columns, the balance sheet is found, and put in the fifth set of columns, so that the sheet now contains all the proc-

esses, which can be analyzed in any way desired, with the help of the abstract sheets if necessary.

The abstract sheets can be made to contain items not on the ledger, as, for instance, accounts payable with the disbursement accounts offsetting them, when, as sometimes happens, the books are kept entirely on the plan of receipts and disbursements and nothing is entered on them until it is paid, and yet where there is available a list of unpaid liabilities.

An advantage of this method is that any change made in the books back of an audit can be instantly detected and proved. It is also a safer plan to adopt when the auditor does part of his work in advance of a closing period and then leaves the books, resuming his work later. This is frequently the case about the first of January, when the auditor could not handle the usual annual rush of work, unless he was able to do part of several audits in December. It also enables him at other times to employ otherwise idle days in abstracting parts of a regular audit in advance.

As the columns must always balance, it will be seen that an error in the trial balance will be found, unless it occurs in the accounts receivable or payable, which are treated by totals. A similar method of abstracting them will discover errors there also, as already indicated in speaking of methods of finding errors in trial balances.

However the preliminary work is done, when the actual scrutiny of the books is finished, the auditor takes the results of his investigations to his office and thoroughly studies them. In order to have these in the proper condition to be thoroughly understood, it is necessary that he should have made proper notes of the work as he went along, and it is better always to have these notes on the same sized paper as those containing

the schedules. Many assistants fall into the habit of making notes on ordinary sheets of paper, sometimes of very small size, which are apt to be lost or mislaid, and at best, are not suitable for filing with the other papers. The notes should contain everything important, including the reconciliation of the bank account, a list of vouchers that are missing or not properly approved, and a notation of any irregularities to which attention should be drawn. In making these notes it is imperative that everything be plainly stated, leaving nothing to the memory, and using none but the most easily understood abbreviations. It is astonishing how much a man can forget in a very short time, so that a memorandum which was very clear at the time it was made becomes absolutely meaningless after the lapse of even a few days. It is still more important when the report to the client is to be made up by some one else in the office that all notes shall be intelligible in themselves.

152. *The auditor's report.*—With all the data before him the auditor proceeds to make up his report. When it is to be submitted to men who know little of the technicalities of bookkeeping, the report should be made as simple as possible, and the salient points brought out as prominently as can be done. In order to effect this, it is frequently advisable to depart from the conventional form of statement. Many business men fail to grasp readily the significance of a profit and loss account that is made up in the form of a balanced table, but if the various profit items are listed and the total carried into the last column, and the different expense items are listed and the total carried out and deducted from the total profits, they understand it at once. The distinction between the different tables of a revenue account can be shown equally as

well as in the more formal method. The sacrifice of a little red tape is a small price to pay for the advantage of having a report that any one can understand at a glance, even if he knows practically nothing about formal accounts.

In the letter accompanying the report there should be specific mention of every item to which attention should be called, and a recommendation of every change in methods that may be deemed advisable, or else a reference to them as having been taken up and explained verbally. The auditor must be especially careful to call attention to any points that are not covered by the examination, and to any infractions of the principles of correct accounts. Unless he thus puts himself on record in writing, there is apt to come a time when he is called upon to make explanations and he can do so much better if he can refer to his written warnings, than if he has to depend on his client's memory as to conversations.

Some auditors burden their reports with an immense amount of detail, virtually copying all their notes, while others give only the final net results without showing how they were reached. The middle course would seem to be the best, leaving out all detail that is not essential to a clear understanding of the conditions, but not omitting anything that will lead to a proper comprehension of the business under review or will convey useful information. After calling attention to all the important items that are shown in the statements submitted, the auditor will usually find that he has noticed places where improvements can be made in the method of the accounts or in the office, and he will proceed to recommend them to any extent that he thinks wise. He will do well to confine himself to only a few of

the most important points, unless he has been requested to propose changes, for the ordinary office-man is very conservative and does not like to be told that his methods should be radically changed.

These remarks apply to the ordinary audit which has been made for the benefit of the officers and directors of a company. In the case of an audit made for publication a more formal certificate is given by the auditor, certifying that he has examined the books, accounts and vouchers and has prepared the revenue account and balance sheet, which in his opinion are true exhibits of the business and condition of the company, and this may be qualified by stating that he assumes no responsibility for the inventory, except that he believes that it was taken in a correct manner.

CHAPTER XVII

TESTIFYING

153. *The auditor as a witness in court.*—When the auditor has finished his report, he is sometimes called upon to give testimony in court in regard to it, not only in criminal cases, but often in support of his client's claims in civil suits. His attitude as a witness should be as a strictly impartial judge of the truth as he finds it in the accounts. The lawyer opposed to his client will try to place him in the category of an advocate, but he must strenuously deny the insinuation and assert that his findings are based on the facts as they are and not as his client would like them to be. He must tell the truth and nothing but the truth, but he is not obliged to tell the whole truth, except in response to direct questions; that is, he is not expected to volunteer any information that is prejudicial to his client's interest.

154. *Accountants' distaste for testifying.*—Many accountants dislike the task of testifying, even in simple cases, and will get out of it if they can. Even clear thinkers who are in full possession of all the facts bearing upon the subject and who could lucidly explain them in the quiet of an office, utterly fail to make even the simplest point clear to judge or jury. This may arise from a too technical treatment of the subject that will be so far above the heads of any but experienced bookkeepers that not a sentence is grasped by court or jury, or it may be caused by too great an eagerness

to explain all the steps that led to the conclusion, involving so long a story that the main point is lost in the mass of words, or it may come from an inability to recognize what facts are really important and bear directly on the point he is trying to prove. The opposing attorney is apt to intimate that the auditor is bringing in extraneous matter for the sake of clouding the issue or of manufacturing evidence that does not belong to the case. His only safety lies in not getting excited, in answering deliberately and with due regard to all the possible meanings of his words, and in not answering any question until it is clearly put and thoroughly understood by judge and jury. Many attorneys have so little knowledge of accounts that they cannot put such questions properly, and the witness often sees their errors but cannot correct them, except occasionally by restating his own attorney's question, prefacing it by saying "if you mean so-and-so."

155. *The law of evidence.*—The auditor should have some general knowledge of the law of evidence so as to know what answers are admissible. If he is in doubt he should always wait long enough before answering to allow time for objection to the question and if his answer is interrupted by the offering of an objection he should at once cease speaking and not try to get in his answer in spite of it. A witness who has a fair idea of the rules of evidence can usually tell whither the questions are leading him, and when one question is asked he can readily surmise what the next one will be, and will have time to prepare for it. He will thus avoid being caught in any trap that is intended to discredit his whole testimony by leading him to make statements that are apparently contradictory, although not really so, but which he will find it hard to reconcile un-

less his own attorney is so thoroughly posted that he can extricate him by proper questions.

156. *Methods of the opposing attorney.*—Sometimes the opposing attorney will lead a witness to speak of his qualifications as an accountant with a view to making him appear so conceited that the jury will be prejudiced against him. In answering as to his experience and qualifications the auditor should be as modest as his bump of self-esteem will allow him to be, never volunteering any remarks about important cases in which he has been employed. He can leave it to his own attorney to bring out facts enough to establish his reputation on a proper basis. This leads to the remark that it is important that the attorney and the auditor who is employed by him should have a thorough understanding of all the points that are to be brought out, and the way in which they can be proved in the simplest possible manner. Unless the attorney does thoroughly understand the accounting side of his case the auditor is liable to have a difficult and thankless task before him when he enters the witness stand. Many attorneys know so little of accounts that they blame the accountant when his findings do not help the case in the way they think they should. They are continually discovering the most wonderful evidence from a cursory survey of the books and when the accountant tries to show them that there is nothing suspicious about the particular entries they have unearthed, they think he has become disloyal to the client, or perhaps that he has been influenced by friendship for the other side, or something more substantial than friendship.

Above all things the auditor should keep his temper when on the witness stand. Some attorneys delight in saying things during a cross-examination that are in-

tended to exasperate the witness and drive him to make hasty answers that may lead to disagreeable results. If the witness is a thorough master of all the facts, and of the conclusions to which they naturally lead, and remains cool and deliberate, he never need fear any cross-examination, however severe it may be.

157. *The auditor's limitations as a witness.*—When testifying as an expert he must remember that there are limitations to his knowledge. He is a competent witness in regard to all accounting principles and their practical application. If he is testifying as to the average profits of a business, he would be allowed to state what the proper amount of depreciation on buildings and machinery would be in the revenue account, but if he is examined as to the present solvency of a business, he would not be competent to testify that the building and machinery were now worth what they cost less the depreciation that he has allowed, unless he qualified not as an auditor, but as an expert appraiser. This is because expert testimony must be the best of its kind, and while he is the best expert in regard to the profits and expenses of a going business, the professional appraiser is a better one in regard to present actual values.

158. *Systems and systematizers.*—When the auditor has handed in the first report on an audit for a new client, he is frequently asked to give his opinion of the methods in vogue in the office, unless he has already treated of the subject at length in his report. This will give him an opportunity to bring to the notice of his client the great importance of a proper system. It is unfortunate for the reputable accountant that there is no word that will adequately express the idea that would prevent the necessity of using the over-worked word

system, which at present is "under a cloud by reason of having been too often seen in questionable company," to quote from a recent article by W. H. Roberts in the *Auditor*. "It has been used and abused by all kinds of office supply dealers, furniture makers and the mail-order crowd generally, until it means almost anything from a set of copyrighted follow-up forms to a stack of vertical files, and it fails to convey to the plain business man any idea of the service which the auditor is able to give."

A goodly number of business houses have been the victims of some of these so-called systematizers who are more anxious to find a customer for their cabinets or their fancy blanks than to furnish an office with a complete and satisfactory system of accounts.

159. *A system should fit the business.*—The auditor who attempts to formulate a system that will fit the office must avoid adopting pet methods or getting into ruts, for if he does he will find himself fitting the business to the system instead of the system to the business, a practice which is said to be the greatest fault of one of the largest of the commercial business organizers. It is necessary to make a thorough study of the whole business, in all of its departments, and then carefully to work out all the details before attempting to put any of them into practice. Otherwise, methods may be adopted in one part of the accounts which will not fit in with those afterwards adopted in another, and the result will be confusion in both.

It is just as well not to state what one expects to accomplish until the whole plan is outlined, when it can be submitted in a general way to the client, so as to obtain his co-operation and support, for without these it is useless to attempt anything. There is sure to be

opposition on the part of some foreman in the workshop, or bookkeeper in the office, who has his own ideas as to how things should be done and who will resent any attempt to change his methods. With the positive backing of the head of the business and a thorough mastery of the problems to be met and solved, and of their best solution, the auditor must formulate his plans and then carry them out without regard to opposition of any kind. But while he must stand firmly for his own ideas, he need not antagonize any one whom he can possibly win over by a careful presentation of the merits of the new methods. It is well to listen to all the advice offered, if too much time is not wasted thereby, and then to ignore it completely, unless, perchance, there is a grain of information to be gained from it.

160. *System-making demands much general knowledge.*—A correct system of accounts usually involves a study of many more things than the books. It is necessary to grasp fully the whole routine of the business, so that the information that finally should appear on the books shall get into the office in the right shape to be properly analyzed and collated. This will mean the installation of proper methods in the shops, the receiving and shipping departments and all other places in the entire establishment where goods are made or handled. In fact, every feature of the whole business should be studied with a view to improving it. A recent article in the *Auditor* gave an instance of the benefit an auditor can render even in regard to correspondence, which would not ordinarily be considered to be within his province. In this case, the auditor noticed letters to parties who had returned goods, in which they were told that the house objected to taking back the goods, that they had been shipped according to orders, that they

were high-grade goods and so on. He plainly told the proprietor that this was bad business, that by forcing the goods on the unwilling customers he might save the sale of that particular shipment, but that he was sure eventually to lose the customer. His advice stopped the practice at once.

161. *Cost systems the work for specialists.*—This whole matter of system-making is becoming a specialized department of auditing, especially with reference to factory costs. It is a very large subject and the field is practically unlimited, but because it is so largely specialized, it is not necessary for even the professional auditor to master it, unless he intends to follow that line almost exclusively. If he is able to institute a proper system in an ordinary office, he can always make an arrangement with a specialist to handle the intricate problems of a cost system, if such comes to him in the course of his regular business. For this reason questions on cost systems should not be asked in the C. P. A. examinations, except perhaps in the most general way. Not to go too far into details, therefore, it is sufficient to say that the idea of a cost system is the placing on the books in a logical way the results of the operations in the factory or shop.

Taking the item of labor, for instance, we find on books kept according to the old methods a constantly increasing debit balance in the labor or wages account, which does not disappear until it is charged to profit and loss at the end of the year. In the meantime it remains on the ledger and trial balance as an asset, or at least on the asset side. Of course, everyone knows that there is no such thing as labor on hand, that it has all gone into the product of the factory. The object of the cost system is to put this labor into the output on

the books, and to do it in such a way that it will be charged to the specific process into which it has gone.

The same is true of the material used. The result should be that there is no balance in the labor account, while the balance of the material account or accounts should show approximate inventory of material on hand. The account with the output should show the amount of material used and of labor expended on each class of the product, more or less subdivided, according to the character of the business or the thoroughness of the classification. The amounts chargeable to each subdivision of the output would be ascertained by a proper system of time cards kept by the workmen themselves or by a timekeeper, and by an adequate system of storekeeping to take care of the issue of material. Details will necessarily vary with the character of the business, the amount of specialization in the factory, and the facilities for gaining the information.

The direct cost will be entirely covered in this way, but there still remains a large element of cost which does not enter directly into the product, such as the labor of foremen and general helpers, as well as what is known as the co-expense, that is the general expense of the whole business including rent, insurance and office salaries and expense, or at least such portion of the latter as is not considered chargeable to selling expense. To allocate these exactly to the different parts of the output would almost always involve too intricate a calculation, while it would often be absolutely impossible. They are usually distributed on the basis of the direct labor, and sometimes, when the system is not pretending to be an elaborate one, by the adoption of what is called an "arbitrary" instead of a calculation each time on the ratio of the direct labor. This is an arbi-

trary percentage of the direct labor based on the results of more or less protracted experience. This is added to the direct cost for a definite period long enough to test its accuracy by comparison with the corresponding accounts when it is readjusted to fit the actual conditions, until it has become so nearly accurate that it can be depended upon to work out in the long run. There may be one arbitrary to cover all the indirect cost, or several to cover subdivisions as the business may demand. When the arbitrary is established, it is possible to ascertain the cost of any part of the product so closely that it is virtually exact, and can safely be used as the basis for figuring the selling price.

The objection is often made by manufacturers that the knowledge of the cost does them little good, because the selling price is fixed by competition and they cannot raise it in any given instance if they discover that the cost in that instance is greater than they had supposed, but the objection is very short-sighted, for the knowledge that one class of their output is unprofitable is bound to be valuable to them if for no other reason than that they can instruct their salesmen not to push the sale of the unprofitable items, but to devote their energies to those that pay better. If they are on sufficiently friendly terms with their principal competitors they may be able to show them that it would be advisable for all of them to raise those particular prices.

In instituting a cost system there is abundant opportunity for the exercise of ingenuity in the devising of methods that will reach the desired information by the least expenditure of time and labor, especially in the factory itself. It will not do to ask the ordinary foreman to keep an elaborate set of accounts. All the data that are made up in the factory should be made as

simple as possible, provided they contain enough information to enable the office to reach the desired results when they are collated. The temptation of many auditors is to make the system so elaborate that it is clumsy and difficult to carry out, so that those whose duty it is to attend to the details soon find the work burdensome and allow it to fall behind, with the result of bringing discredit upon the whole system and causing it to be abandoned. This is especially likely to be the case with systems inaugurated by those so-called accounting companies whose principal business is the manufacturing of stationery, and the selling of cabinets. They are so anxious to increase the sale of their commodities that they multiply blanks, and make the whole system so cumbersome that it breaks in two from its own weight.

162. *Loose-leaf books and cards.*—The auditor is frequently asked his opinion of the advisability of using loose-leaf books and card ledgers. He will often find a considerable prejudice against them in the minds of office managers and occasionally will encounter a man who goes to the other extreme and wishes to adopt the loose-leaf plan in all his books. The advantages of this kind of ledger are so well known that they hardly need to be enumerated, the principal ones being the elimination of all dead accounts, the keeping together of all the pages of each account, however large and for however long a time, and the ability to keep the accounts in a strictly alphabetical order so as to do away with the necessity of an index. As the ledger is not a book of original entry and is not admissible as evidence in court, except as its entries have been identified with those in the original books, there seems no possible objection to its being in loose-leaf form. It would appear less advisable to

have the cash-book take this shape, and auditors usually advise against it, as there is too much opportunity for manipulation by the substitution of one leaf for another. In handling the sales there seems no better plan than the making of a carbon duplicate of the original sales ticket, filing it in a loose-leaf binder and posting directly from it to the customer's account. A recapitulation sheet is provided with columns for the distribution of the sales to departments if the business is so divided, the entry on this sheet being identified with the sales sheet by the numbers of the latter, the totals for the month being posted to the credit of sales account or its subdivisions.

163. *Objection to the card ledger.*—The question of the advisability of the card ledger has been very warmly debated, the principal objection to it being the danger of losing or misplacing a card. Where one man does all the work, there does not seem to be any great advantage, if any, over the loose-leaf ledger, as it takes about as long to find the card, take it out of the drawer and put it back as it does to turn up the account in a ledger that is alphabetically arranged. Where the bookkeeper's time is valuable and he has a cheap assistant, there is possible a saving of valuable time by having the assistant take the book of original entry and pick out the cards on which entries are to be made, piling them up in the order of the entries on the book. The bookkeeper can then post the items without losing any time in turning up the accounts, and when he is through with them the cards can be returned to the files by the assistant.

164. *Modification of the Boston ledger.*—A modification of the Boston, or progressive ledger, that is often advantageous, can be made by the use of the

loose-leaf principle. This ledger carries each account on a line with columns for each month, showing the debits, credits and balances for the month. It is usually ruled with columns for a year's work and all the names are transferred to a new book at the end of the year. The objection to it is not only that all the work of transferring the names is crowded into one month, but that there is a waste of space in the new accounts from one set of columns in the second month to eleven in the last month of the year. On the loose-leaf plan the new accounts each month can be started in the first column of a new sheet, the only precaution necessary being to see that in forwarding totals from one sheet to another they get into the right columns. As the current work will always be in the last occupied column on each sheet there is very little danger of error. In a ledger arranged on this plan, an average of one-twelfth of the accounts will reach the last column and require to be transferred each month, instead of all of them at the end of the year. As a new month is started at the rear of the ledger, the corresponding month of the previous year can be taken out and filed in the transfer binder, so that there will always be one full year in the ledger and no more.

The greatest objection to this form of ledger is that it is not elastic and there is no way of providing for an increase in the number of purchases by any customer beyond the number for which he was originally given space. The billing machine, however, does away with this objection. The advantage of the ledger is that the total debits and credits of the month can be separately proved, and that the trial balance proves at the foot of every page. Another objection is that a customer's

account is strung along a line and there is great difficulty in looking up any past item.

165. *Need for ingenuity.*—The auditor should avoid the error, as we have already pointed out, of having a pet form of ledger or a favorite system of any kind, or he will fall into the habit of trying to fit the business to his favorite method instead of adapting methods to the necessities and best interests of the particular business he is treating. He will not find any ledger or any system of blanks that will be the best for all kinds of accounts, but must exercise his judgment, and will sometimes be obliged to modify his ideas to meet the prejudices of his clients in matters where no real principle is involved. He will find plenty of opportunity for the exercise of ingenuity in devising special forms to take care of special conditions and will find this one of the most fascinating parts of his work, if he has any talent in that direction, and will thoroughly enjoy the satisfaction that comes from the successful solving of a difficult problem.

CHAPTER XVIII

RESPONSIBILITY OF AN AUDITOR

166. *The auditor's duty to stockholders, creditors and investors.*—The position is sometimes taken by a professional auditor that he is responsible only to the person or persons employing him. This is occasionally true, as for instance, when he is employed simply as an assistant to the president or secretary of a company to give his advice in regard to the proper treatment of some or all of the accounts in a report which will be rendered by the officer, and not by the auditor. In such a case he can hardly be said to be acting as an auditor at all, and since he does not give any certificate he cannot be held responsible for anything in the report, unless it can be distinctly shown that he agreed to it. He should be very careful that even this slight connection with the matter is not taken advantage of by the officer, who may incorporate in the report a remark that it was prepared with the assistance of the auditor and thus intimate that it was sanctioned by him.

When a thorough audit has been made and a certificate given of the revenue account and the balance sheet, the auditor's responsibility is not confined to the board of directors or the officers simply because they were the ones who authorized the work. His report, as a rule, is intended for the information of the stockholders, of the creditors and possibly also of intending investors. It will not do for the auditor to suppress any facts because they are well known to his direct employers.

The stockholders are entitled to a full knowledge of the condition of their business, including such a statement of its operations as will give them an intelligent idea of its true earning capacity. They cannot themselves gain this knowledge by a personal examination of the accounts, even if they had the accounting ability requisite for the task. They must depend upon the professional auditor, and when it becomes generally recognized that their confidence in him will not be misplaced, a long step will be taken in the direction of making the periodical professional audit mandatory, either by law or, what is perhaps better, by universal custom. Therefore, it behooves the auditor to be very careful that his certificate gives the actual facts as far as he has been able to ascertain them. The best touchstone he can apply to his report is to ask himself whether he, if he were a stockholder, would be satisfied with it. If he feels that his not divulging certain facts, known to him and not to the stockholder, could give the latter the right to complain of his action, he is not justified in signing such a report.

Mr. A. Lowes Dickinson sums up the whole matter when he says:

It may be useful to state the position which public accountants claim to take up in giving their certificates. Accounts should show the actual facts, that is to say the profits stated should be as far as possible the actual profits earned by the undertaking, and the wording should be such as to truly and correctly describe the nature of the various items; the balance sheet should show the true value of the assets, or where that is not possible or expedient in the interests of the stockholders, should state the basis on which the valuation thereof is taken, and the excess, if any, over actual value; and the wording adopted should be such as would explain to any reasonable business man the

nature of the items included in each group of figures. The accounts are those of the directors, and they are necessarily the final arbiters of the form which they should take. But, if the independent auditor objects to any of the items as not being properly described, or to the statement as a whole as not showing the true profits or the true values of any of the assets or liabilities, it will be his duty to qualify his certificate by embodying his objection therein. If he were appointed by the stockholders, it would be his further duty in the event of the directors declining to affix his certificate to the accounts, to take the earliest opportunity of communicating his views directly to the stockholders. The reason of this attitude is that the corporation is the property of the stockholders and not of the directors as such, the independent auditor being, in this case, the representative of the stockholders to carry out fully the inspection of the accounts which, in a private partnership, each partner would undertake for himself. The directors, being appointed by the stockholders to manage the undertaking, are entitled to state the accounts in any manner they think fit before presenting them to the auditor. It is then the duty of the latter either to certify that the statement is correct, and shows the true financial position of the corporation, or to specify in what particulars it fails to do so; the stockholders having appointed the auditor are entitled to know his opinion as the result of his investigation, and he is therefore bound to report to them direct if the directors refuse to transmit his report.

167. *Special Investigations.*—Although the word audit is used principally in regard to the periodical examinations of a set of accounts, it also covers cases of special investigation which are usually undertaken only once in connection with any particular concern. These occasions arise when several companies are to be combined into one, when a purchase of a business, or a portion of it, is contemplated, or whenever it is necessary for any other purpose to find out the true condition of a

business at any specified time. The scope of the investigation is determined by the character of the information that is desired and by special circumstances peculiar to each case, and the responsibility assumed by these circumstances.

When acting for proposed investors of capital it makes a difference whether the client is proposing to invest his own money or is a promoter or broker who expects to induce others to invest theirs. While there is responsibility in either event, it is not so great in the first case as in the other. When acting for a client who proposes to invest his own funds, the investigation may be very greatly limited by the client's own knowledge of the business or by his confidence in the integrity of the seller. His instruction to the auditor, therefore, may be to make only a very general examination of the accounts.

It may be asked why any examination at all should be made, if the integrity of the seller is unquestioned. The reason is, because there are many ways of misstating facts and the conclusions that may be drawn from them that are by no means intentionally dishonest or misleading, and yet these may be as disastrous in their effects as if they were deliberately intended to deceive. The annual statements that have been prepared by the bookkeeper of the seller may have been made up on an entirely wrong basis, which even if they were satisfactorily understood by the seller might convey an entirely erroneous impression of the condition and earning power of the business to the intending purchaser. Acting on his client's instructions, the auditor would confine his examination largely to the methods adopted by the bookkeeper in preparing his statements of profits and his balance sheet, with special reference to the prin-

ciples followed in setting up depreciation and other reserves and in the valuation of stock on hand and other assets. He could assume the clerical accuracy and honesty of the accounts as taken for granted.

In his report to his client he should be careful to specify the limited nature of his investigation, quoting the express instructions given to him as the cause of the limitation. Otherwise he is liable to be blamed for having made too superficial an examination, if it turns out that the client's confidence in the integrity of the seller was not justified, or if for any other reason the investment should result in loss. He may not be able to recall to his client's memory the limited nature of the instructions; which would almost certainly have been largely, if not entirely, verbal.

If the client, even when he is investing his own funds, is a person of little or no experience in business matters, the auditor should not be content to take instructions from him, if in the auditor's judgment they preclude him from taking up phases of the investigation which may seem to be vitally important. He should point out to his client the necessity of the more extended examination, and if his advice is not followed he should in his report call specific attention to the omission.

168. *Great responsibility connected with a merger.*— A much greater responsibility rests upon the auditor when he is employed by a broker or promoter to investigate the affairs of several concerns that are to be consolidated or merged into a new company whose stock is to be offered for sale to the general public on the faith of his certificate incorporated in the prospectus.

Unless the auditor has a sufficiently long and intimate acquaintance with the promoter to inspire him with entire confidence in his integrity, he should very care-

fully investigate his character and antecedents. While the auditor is concerned only with the facts disclosed by his investigations, there is danger, in dealing with an unscrupulous promoter, that some of the facts may be skillfully concealed.

It may be equally important to inquire as to the character of the parties selling their enterprises, if they propose to dispose of them entirely, and also concerning their reasons for selling. While there are plenty of legitimate reasons why a person might wish to retire entirely from a business, the auditor should take especial care under such circumstances to see that there are no hidden reasons for selling, such as a steadily declining business or some new conditions in the trade that will make the business suddenly unremunerative. An unscrupulous owner of such a business might so manipulate things, in anticipation of a sale, as to lead an auditor to give a more favorable report than he would have done if his suspicions had been aroused.

The character of the owners of a business, and of the business itself, is sometimes of importance to the auditor when he is not asked to give a certificate of condition or of earning power, but an apparently innocent statement that the books are correctly kept. For instance, the promoters of a get-rich-quick enterprise might induce a reputable auditor to examine their books periodically and certify simply to their clerical accuracy and then publish a statement that his accounts were regularly audited by Mr. Blank, the well-known accountant. Nine out of ten people, seeing this statement would interpret it to mean an endorsement of the whole scheme by the auditor. The auditor should not allow his name to be used, even in this limited way, in connection with anything that is likely to be fraudulent.

169. *The auditor's statement for a prospectus.*—In preparing a statement to be used in a prospectus by a promoter or by a board of directors the auditor must be, to a great extent, the judge of what he shall say. He must remember that a half-truth is sometimes worse than a whole falsehood and that a statement may be literally true and yet be deceptive. Not to mention such a crude misrepresentation as putting among the accounts receivable a large debt due from one or more of the officers, he may be asked to certify to the average profits for a term of years. This he can safely do, if the profits have been reasonably steady or have been increasing from year to year, but he certainly should not do so if they have been steadily declining. The intending investors have a right to know the true condition of affairs. It may be that the decline in profits is susceptible of complete and satisfactory explanation, having been caused by conditions that will be put an end to when the consolidation is effected. However well satisfied he may be of the adequacy of the explanation, the auditor must not let it influence him to the extent of causing him to make a misleading report. He must leave to the promoter the task of making the requisite explanation and to the investor the option of believing it or not.

170. *The auditor should not prophesy.*—Again, the auditor must not assume to be a prophet; that is, he must not say in his report that there is no reason to doubt that there will result from the consolidation a considerable increase in the net profits of the whole business on account of economies to be introduced, or on any other account. He may very properly include in a combined statement for all the concerns, the total

amounts paid for executive salaries, for salesmen's salaries and expenses in competitive territory, and any other items which may be affected by the consolidation. The directors or promoters can then use these facts to show that large economies may be made by the reduction in the number of executive officers, of salesmen, and so on. As long as the auditor is honestly quoted and a fair use is made of his facts, he is not concerned with the deductions made from them.

171. *Responsibility for accuracy.*—In regard to the responsibility of the auditor for the accuracy of his report, an English court decision says:

An auditor is not bound to do more than exercise reasonable care and skill in making inquiries and investigations. He is not an insurer, he does not guarantee that the books do correctly show the true position of the company's affairs, he does not even guarantee that his balance sheet is accurate according to the books of the company. If he did, he would be responsible for error on his part, even if he were himself deceived without any want of reasonable care on his part, say, by the fraudulent concealment of a book from him. His obligation is not so onerous as this. Such I take to be the duty of the auditor; he must be honest, i. e., he must not certify what he does not believe to be true, and he must take reasonable care and skill before he believes that what he certifies is true. What is reasonable care in any particular case must depend on the circumstances of that case. Where there is nothing to excite suspicion very little inquiry will be reasonably sufficient, and in practice, I believe, business men select a few cases at haphazard, see that they are right, and assume that others like them are correct also. Where suspicions are aroused more care is obviously necessary, but still, an auditor is not bound to exercise more than reasonable care and skill, even in case of suspicion.

In another case it was said:

Auditors must not be made liable for not tracking out ingenious and carefully laid schemes of fraud when there is nothing to arouse their suspicion, and when these frauds are perpetrated by tried servants of the company, and are undetected for years by the directors. So to hold would make the position of an auditor untenable.

At the same time it has been held by a court that "it is the duty of an auditor of a company's accounts not to confine himself to verifying the arithmetical accuracy of the balance sheet, but to inquire into its substantial accuracy, and to ascertain that it contains the particulars specified in the articles of association, and is properly drawn up so as to contain a true and correct report of the state of the company's affairs."

Again, another judge said:

The auditor's business is to ascertain and state the true financial position of the company at the time of the audit, and his duty is confined to that. But then comes the question: How is he to ascertain that position? The answer is: By examining the books of the company. But he does not discharge his duty by doing this without inquiry, and without taking any trouble to see that the books themselves show the company's true position. He must take reasonable care to ascertain that they do so. Unless he does this, his audit would be worse than an idle farce.

While these decisions somewhat limit the responsibility of the auditor he should not try to evade a just responsibility under the plea of having followed instructions, nor allow himself to grow careless in his ideas as to what constitute reasonable care and skill.

172. *Loyalty to his profession and to his client.*—As a professional man the auditor should not be deterred

by the fear of losing his client from giving advice in regard to enlarging the scope of the work to be done if he thinks the instructions given him were inadequate. He had better decline to do the work at all than to attempt to do it when hampered by instructions that in his judgment will prevent proper justice being done to his client. Above all, he should not allow himself to be influenced by the inadequacy of his remuneration when he has made a contract for a fixed price and finds that he has underestimated the time necessary to carry it out. It is his duty to give his client the best service that he is capable of rendering, and he is not true to proper professional standards if he does not do so, regardless of any personal pecuniary loss that may ensue. The interests of the client must always be paramount.

173. *Responsibility for the work of assistants.*—In an investigation of any considerable size, it is manifestly impossible for an individual auditor to do all the work himself. He must delegate a large part of it to assistants. This does not relieve the auditor from personal responsibility, for it is his duty to employ only such assistants as can be thoroughly relied on, and to exercise such a supervision over them as will ensure the proper carrying out of his instructions. For this reason he should have a staff trained by himself and familiar with his methods, sufficiently large to enable him to have at least one man on each set of accounts that he is examining, if that is possible; and if a sudden rush of work should make it necessary to employ entirely new outside men, he should assign them to the least important part of the whole work, and then watch them much more closely than he does his regular force. This organization of an office will necessitate the employment

of a larger permanent staff than can be kept constantly employed, unless arrangements are made with regular clients whereby their audits can be made continuous.

In order to avoid assuming this responsibility for others, some auditors prefer to do no more work than they can personally attend to, with the assistance of one or two persons working with them. But such men will never attain any high position in the profession and will have no time for study and research. By a proper system of reports by the assistants and a proper method of doing the actual work, the principal can be kept in as complete touch with the work of his assistants as if he had personally inspected the books and made the notes himself. Of course, the more thoroughly trained the assistant is, the less will be the necessity for supervision of his work, but it should never be omitted altogether, even in the case of a regular periodic audit, which has been repeated so many times that the work is almost perfunctory.

174. *Danger of excessive confidence in persons.*—The auditor must be careful not to allow his opinion of the man whose accounts he is examining to warp his judgment. He is liable to become so accustomed to finding the accounts in perfect condition that he is lulled into a feeling of security and will allow some point to remain unguarded through carelessness or a feeling of confidence in the man whose work he is auditing. While it is difficult sometimes not to become thoroughly convinced of the trustworthiness of a man with whom one is brought into frequent contact in a friendly way, it is a dangerous frame of mind to get into and may lead to disastrous consequences. It is the same mistake that many employers make, and against which the auditor is supposed to guard them. It is a little awkward some-

times to seem to be too particular in asking for explanations from a man whom one does not really suspect of any wrong, but it is better to seem too inquisitorial than to run the risk of having to acknowledge that one has failed in one's full duty.

CHAPTER XIX

CHARACTERISTICS OF THE ACCOUNTANT

175. *The power of analysis.*—Whether a young man should be advised to enter the profession of accountancy depends altogether on the characteristics of the man himself. It is not everyone who can make a good accountant any more than everyone can make a good lawyer or physician. One of the very first requisites is, of course, a mathematical mind, and that phrase implies much more than that a man should be quick at figures. He must be able to see the fundamental principles underlying mathematical calculations, in other words to know the “why” of every mathematical process with which he is liable to be brought in contact.

Closely allied with this is the power of analysis, which will enable him to go to the bottom of a problem or a situation and see clearly what are its constituent parts, which of them are essential and which are merely fortuitous. He must be able to see the relations between different parts of a business and how one part affects another and to recognize the inevitable result of a given line of action. Perhaps the best instance of this power of analysis is seen in a rule recently enunciated in the *Chicago Banker*, by which a bank officer can detect “kiting” on the part of a depositor. It is “that a man’s bank movement cannot be greater than his total sales.” The only deposits that a man in ordinary business can make must be the proceeds of sales, as he has no other legitimate source from which to get money.

If, then, his sales amount to \$300,000 a year and his total deposits of currency, checks, drafts and customers' notes amount to \$500,000 during the same time, the absolutely necessary deduction must be made that \$200,000 of these deposits are fictitious and consist of exchanged checks, drafts or notes, or in other words, "kites." Yet very few bank officers are capable of applying this simple reasoning to the accounts of their customers, until it is explained to them, although they are all anxious to ascertain the existence of the pernicious practice of "kiting" and to put a stop to it.

If the prospective accountant desires to take up the department of "factory costs," he must be able to understand quickly all the various processes of manufacturing, so far at least as to grasp the relative importance of each to the other and to the finished product. It is not necessary for him to have a practical knowledge of all the details of the various processes, but he should have a good idea of the fundamental principles involved.

176. *Practical experience must supplement academic training.*—The man adopting accountancy as a profession will find out that while an academic or theoretical knowledge of the science of accounting is a valuable thing to have, he must supplement it by a longer or shorter course of actual work, so as to gain the practical experience in the application of his theoretical knowledge. This is true, however, of any profession. The best way to obtain this practical experience is, of course, to ally himself with an established accountant who will always be ready to give him all the aid he can in explaining the problems with which he has to grapple. If he has the natural characteristics that fit him for the work, he will find that his progress will be rapid and

that it will not be long before he will take rank as a senior accountant, to be sent out in charge of work, virtually as an independent man relying on his own resources, with the office to fall back on, if he comes across anything that he does not feel himself thoroughly competent to deal with. The next step would be to set up for himself, or to become a junior partner in an established firm, usually the one with which he has been connected.

177. *The work interesting and varied.*—He will find that his work as an auditor will be interesting on account of its varied character. He is constantly meeting new people and new conditions. There is none of the “demnition grind” about his occupation, for one day he may be investigating a small retail store and the next a large railway company. He is obliged to familiarize himself with all classes of business and to learn more or less of all kinds of processes. He learns a great many trade secrets even where they may be in actual violation of such laws as the Pure Food acts. He finds out, for instance, when he proposes to institute a plan for ascertaining the relative cost of making different kinds of fruit jellies that there is absolutely no difference between them except the labels on the jars and that they all cost the same. He will be sent to all parts of the country, with his expenses paid at the best hotels, and will probably be well treated by the people to whom he is accredited.

178. *Many business men unaware of the auditor's importance.*—He will find that the field for the exercise of his talents is practically unlimited, and that the appreciation of his services is growing constantly and at an increasing rate. But he will meet with many disappointments, for he will find that it is uphill work to

educate the ordinary business man to a proper sense of the benefits to be derived from a scientific treatment of his accounts and of his office methods. The man who will welcome any suggestion in regard to better machinery in his factory and will go to almost any expense to expedite the work there, will not be able to see that it is worth while to spend even a small amount to perfect the work in his office, but will be content to do things the way his father and grandfather did. One satisfactory feature of the situation, however, is that when a man is once convinced that the accountant has rendered him invaluable service, his conversion is complete and he becomes an enthusiastic advocate of new accounting methods and is always ready to introduce the accountant to his friends and to recommend his employment.

Since the establishment of the different societies of accountants in the various states there has been very little jealousy among the different members of the profession, and a feeling of mutual helpfulness has been developed, which is extended to the new men entering the profession from time to time. There is plenty of room for all who are determined to do good, honest work, and the older accountants are ready to give every assistance to active, progressive men, who give promise of developing into thoroughly competent members of the profession.

CHAPTER XX

THE CONDUCT OF AN AUDIT

179. *The preliminary step.*—In describing the proper way to conduct an audit there will naturally be many points repeated that have already been treated of. Their repetition will do no harm if it serves to impress them more firmly on the mind.

In a first audit a general study of the whole business must be made, so that all its peculiarities will be thoroughly understood. Notes should be taken of the principal points in the articles of partnership or of association, the different duties assigned to partners, or to officers, and any other points which would affect the conduct of the business. A sketch should be made of the character of the business, the articles manufactured or dealt in, the methods of recording transactions, with special reference to the presence or absence of internal checks on the accuracy of the accounts, both in regard to those dealing with cash and those that record the movement of material and goods from the time they are received until they are finally shipped out. In doing this, there will necessarily have to be made a list of the books that are in use, and of the persons who are authorized to receive or pay money, sign checks and approve vouchers and to order goods. The authority exercised by these persons may be derived from the articles of partnership, the by-laws of a company or the resolutions of its board of directors, or may have developed gradually by virtue of undisputed custom, without any

formal grant. With these data well in mind, and with a general idea of the customs that prevail in the particular line of business engaged in, he will be able to conduct, not only the first, but all subsequent audits in such an intelligent manner that his report will furnish much more valuable information to his client than the mere facts that his books are in balance and that all the money received has been satisfactorily accounted for.

180. *Proving the cash balance.*—In proceeding to the actual work of an audit, the first step would be to prove the cash balance. As it is seldom possible to verify the cash at the point where the cash-book has been footed in ink and ruled off, the auditor should add all the columns of the cash-book, copying the totals in his notes to be again compared with the cash-book at the next audit. He should see that there were no checks in the cash that did not represent entries in the cash-book; and should list all due-bills and other non-cash items. He should have the bank account balanced and verified at that time and should prove it back to the reconciliation made at the end of the period covered by the audit. The accuracy of the receipts shown by the cash-book for more or less consecutive days can be verified by obtaining from the bank copies of the deposit slips for those days and comparing them, item by item, with the entries in the cash-book. The disbursements must be verified by comparing the items in the cash-book with the checks and with the vouchers, seeing that the latter are properly approved and that they are supported by invoices showing the receipt of the goods or by evidences of services having been rendered. In a columnar cash-book special care must be taken to scrutinize all items of any considerable size that appear in the

columns devoted to any expense account. In general, any unusual or extraordinary payment or receipt should be carefully noted, and if any payment is of such a nature that it should not be allowed unless authorized by the directors, reference should be made to the minutes to ascertain whether proper authority for the entry is to be found there.

181. *Importance of the journal entries.*—Some auditors seem to think that the journal needs but a perfunctory scrutiny. It is so easy to make a journal entry take the place of cash that has been abstracted that it is important that competent authority should be produced for any journal entry involving more than trivial amounts, which affect any of the profit and loss accounts. If there is a charge in the journal to any partner or officer, his approval should be written by him either on the journal itself or on the journal-voucher, if such vouchers are used.

182. *Purchases and sales must be on the books.*—The purchase and sales books should be examined to see that the proper returns of purchases and sales are made by each department; that the invoices are properly entered and are checked as to quantities and prices by the proper persons. As far as possible, it should be ascertained that all liabilities for goods purchased are on the books and that no sales are recorded that have not been shipped, or at least segregated from the inventory. Unless there is a proper system in the receiving room, it may not be possible to detect omitted liabilities at the time, but they can be found out later by noting the dates of the bills paid subsequent to the audit, and if any of them are dated prior to the end of the period covered by the audit, ascertaining whether they had been included in the outstanding liabilities at

that time. Bills payable that have not been entered on the books can not be discovered if their proceeds have been credited to the personal account of an officer or partner as a cash payment, unless there are charges for interest paid at dates when no note transactions appear on the books. The auditor is not blameable for not discovering such undisclosed liabilities, unless some such clue is to be found in the books.

183. *Method of checking disbursement vouchers.*—When checking the vouchers for disbursements, the auditor should always mark each voucher with his initials in ink or with a special rubber stamp, or both, so that it will be impossible to pass the same voucher twice or run the risk of having a different voucher substituted after the audit. It is impossible to obtain satisfactory vouchers for individual items on a pay-roll unless it is paid by giving a bank check to each man. Ordinarily the auditor must be satisfied with knowing that sufficient internal checks on its accuracy exist, from its having been made up, checked and paid by so many persons, and in such a way, that it would require collusion between two or more to perpetrate a fraud. In auditing the petty cash, the auditor can hardly expect to find satisfactory vouchers for small items, such as carfare, but his experience will soon teach him to judge whether the items are reasonably correct.

184. *Verification of securities, etc.*—Notes receivable should be inspected by the auditor or evidence of their being out for collection obtained from the banks or other collecting agencies in whose hands they may be. Bonds, mortgages, and other securities should be verified by actual inspection. If it is necessary to verify the ownership of land, it is not sufficient in this country to inspect deeds to the property. It is necessary to ex-

amine the county records, for it is in them that clear title resides. As to inventories, the auditor should be careful in his report to specify how much responsibility he assumes. Usually it does not extend beyond a scrutiny of the extensions and an inquiry into the method of taking it, to see that persons familiar with the articles and the prices have been employed in making it up, and that they are disinterested employés and not officers or members of the firm who might be tempted to manipulate it. Tests may be made of the prices by comparing more or less of them with the invoices showing the purchases. The addition of the inventory should always be verified.

185. *Verification of "controlling account."*—It is not necessary to verify the individual accounts receivable. If a controlling account is kept, it is only necessary to see that the debits and credits to it are correct, and then to verify the trial balance of the customers' ledger by adding up the accounts from the balances shown at the time of the last audit and ascertaining whether the total balances agree with the controlling account. Some auditors make test postings of one or more month's work, but others claim that it is not necessary to do this. If the ledger is not in balance with the controlling account it is not the auditor's duty to find the difference, unless specially engaged to do so.

186. *Preparation of profit and loss account.*—In checking the closing entries and preparing a profit and loss account and balance sheet, the auditor should note whether the proper allowances had been made for wear and tear and depreciation and an adequate reserve set up against losses by bad debts. He should also calculate, and express in the accounts, the amount of deferred assets consisting of such things as unexpired in-

surance and interest paid in advance, and of accrued liabilities, not yet due, for such things as bond interest and taxes.

187. *The balance sheet.*—In the balance sheet assets subject to depreciation should be shown at their full value, with the reserve deducted from them and the net amount carried out. The same treatment should be given to the capital stock if there is any treasury stock or unissued stock on hand. Accountants differ as to whether a balance sheet should be made up with the most liquid assets first, proceeding gradually to the most fixed, or whether the order should be reversed. Whichever plan is adopted, both sides of the balance sheet should follow the same rule.

188. *Advantages of the abstracting method.*—The abstracting method of verifying the accounts of a business has been sufficiently described in the foregoing pages. It necessarily proves the additions of all abstracted columns and all the postings to the general ledger. All other columns should be added by the auditor, or at least such frequent tests made as to amount to the same thing. It is not usually necessary to add both the total and the distributive columns in such a book as a purchase register, but it would be necessary to verify the additions of any columns representing capital expenditures, as well as to verify the nature of the items.

189. *Essential features must be covered.*—Each auditor is liable to have his peculiar methods, and each concern that is audited is liable to have peculiarities that will need special treatment. The only point that the auditor should be absolutely sure of, is that he covers every essential feature of the work so thoroughly that there will be no danger of anything having been overlooked,

that will develop later, after his report has been rendered, and will justify serious reflection on the character of his work, even if it has not caused any very important variation in the statement of the condition or profits of the concern itself.

PART II: COST-FINDING

CHAPTER I

INTRODUCTORY

1. *Few men understand cost-finding.*—No part of modern industrial organization is of greater importance than that of cost accounting. At the same time there is perhaps no part regarding which so little is generally known. In the great majority of industrial establishments the art of cost-finding is still in a crude and undeveloped stage so far at least as individual detail costs are concerned. This is particularly true of the small shop, or the shop which has grown up around a pushing and skilled mechanic, whose knowledge of the practical side of his art is great, but who neither knows nor appreciates the need of scanning his detail costs more closely as his business becomes more and more complex. According to Bradstreet's,¹ four-fifths of the industrial failures in this country are the result of faults, or incompetence of one kind or another, on the part of those who fail.

2. *Purpose of cost records.*—Cost-finding is a complex matter, at best, and as industries grow to great proportions this complexity is increased in like ratio. The methods and approximations which may be ample for a small business which is wholly under the eye of the superintendent, cannot be relied upon when the plant

¹ "Bradstreet's," Jan. 21, 1911, and Jan. 27, 1912.

becomes so large that personal observation is insufficient; system of some sort must be resorted to. Furthermore, the demands of modern industry require vastly more of a cost system than was deemed necessary a short time ago. In most shops, to-day, the cost system is considered satisfactory if it simply shows the cost of producing the several items manufactured. But the modern conception of a cost-finding system is far broader. The modern system must not only show costs as such, but must show them in such a form that deductions may be drawn as to the *reasons* for them and the possibilities of reducing them. Results must be so reliable that the costs may be used as a basis for predicting future shop operations and costs. A cost-keeping system that simply records costs for the purpose of fixing sales prices has accomplished only a small part of its mission, and every day shows an increasing tendency to demand of the cost-keeping department that it furnish all activities of the enterprise such financial statements as will act as safeguards in the conduct of its individual functions.

A good cost system properly conducted should enable the manager to prepare estimates with some assurance that a profit will be made, if the work is undertaken, and at the same time should enable him to meet competition on an intelligent basis. It should tell him what lines of product pay and what do not. It should enable him to gauge the efficiency of each department and to trace the reasons for inefficiency if such exists. It should be his guide and counsellor in directing the activities of his business. On the other hand, care must be exercised that the system installed is not too complex and that the cost of securing the detailed information is not greater than the gain that may result from its possession.

3. *Trained men required.*—As will be seen later there is almost no end to the detail to which a cost-finding system may be carried. In the hands of an over-zealous accountant or one whose range of vision is narrowed by the intricacies of his calling, an over-elaborate system may be installed that will result not only in financial loss, because of the actual expense of operating the cost-finding machinery, but which may act as a clog on the actual machinery of production. The introduction of a satisfactory cost system requires, therefore, more than a knowledge of cost-finding methods. It requires an intimate knowledge of the industry itself, of the particular institution, and a keen discrimination regarding the detail to which the cost-finding is to be carried. Very rough detail costs may be satisfactory in some lines while very refined cost statements may be essential in others. Even in the same establishment the same degree of detail accuracy is not necessary in all lines and a skilled chief cost-finder can save large sums in the operation of his system by a careful observance of the relative aspects of different lines of product.

For these reasons the installation of a cost-finding system should not, usually, be left wholly to the general accountant. It is true, of course, that the cost books for best results should be properly merged into the general accounts and must fit into the broad plan of the general scheme of accounting. But the cost-finding methods that will produce best results will, in general, be the result of the joint labors of the skilled accountant and the manufacturing expert. A careful distinction should be made between principles and the details to which the application of these principles may be carried. The principles of cost accounting are definite and permanent, but the degree of detail to which it is desirable

to carry their application can be fixed only by some one well versed in the details of manufacturing and who knows just what results it is desirable to obtain and what results are useless.

Even the manufacturing expert and the skilled accountant can draw much help by considering the requirements of other departments. Thus the clerical work and accuracy of cost-finding are greatly aided by a proper system of nomenclature and identification. Such matters involve the work of the designing department, and a drawing-room system laid out with reference to the cost-finding system is an invaluable aid.

4. *Each business requires individual study.*—It is obvious also that no particular cost-finding system will apply to all forms of industry. The cards and forms which are admirable for one kind of work are useless in others. The general underlying principles of cost-finding are, however, universally applicable and if the principles are clear there is seldom any difficulty in developing cards and forms suitable to the work in hand. This treatise, therefore, deals with general principles only, and only such blanks and forms have been inserted as are necessary to illustrate these principles.

5. *Importance to whole industries.*—While accurate costs are of great importance to the individual institution, they are of no less importance to the industry as a whole. The manufacturer who obtains contracts by underbidding his competitors, with a price on which he will lose money, not only ruins his own business but destroys that of his competitors. This form of competition is the most dangerous and most greatly to be feared, since it rests, in most cases, on ignorance. It is little consolation to the manager whose costs are accurately obtained to see such competitors go into bank-

ruptcy; for, as fast as they disappear, others equally ignorant take their place. Yet this state of affairs is far too common.

In a competition that came under the writer's observation recently, the highest bid was nearly 50 per cent higher than the lowest. After making all allowances for the lowest bid contemplating scant fulfillment of the specifications, the only reasonable explanation that can be offered for such a great range is ignorance of basic cost-finding principles. This experience is by no means uncommon. Any one who has had experience in opening competitive bids will testify to the wide divergence in prices that usually appears in such competition. It is for reasons such as these that the intelligent manufacturer often finds himself confronted with the fact that his bid must be based on market prices and not on his costs. It is no use to bid higher, unless he has a superior article the merit of which commands the trade regardless of price. On standard articles the "trade will not stand" the higher price. Even here his only hope of succeeding is to know the true cost and to try, by better manufacturing, to so reduce it as to leave him a margin of profit.

Furthermore, it is only too often held that cost-finding methods are secret matters that should be kept from the eyes of competitors. No doubt it may be good business policy to keep actual costs secret but the widest publicity should be given to cost-finding methods if for no other reason than that of educating one's competitor in such methods as shall tend to fair competition. This is now clearly recognized in many fields of industry. The National Machine Tool Builders' Association recognized this important principle some years ago and took active steps toward uniform methods. It would

pay all competing industries to do likewise and publish freely the correct methods by which the costs of their product are obtained.

6. *Inadequacy of crude methods.*—It is true, of course, that many enterprises make money with the crudest kind of cost-keeping systems, but where such is the case there are always other advantageous conditions, the continued existence of which cannot elsewhere be assumed. Many plants, also, make money in spite of antiquated machinery and methods, either because of local conditions or because lack of competition allows large profits. Strong leadership may often compensate for material disadvantages. But these conditions will not be so easy to maintain in the future. As industry grows, competition becomes ever keener in all branches of life, with the consequent requirement of a more exact knowledge of the details of business.

A grocer who fixes the price of sugar by reference to that of his competitor adopts a decidedly unsafe policy. And yet this is a common method of fixing prices in the manufacturing field. Many manufacturers often persist in paying dividends out of capital simply because they do not know what their selling price should be and have fixed it either by that of some competitor or by some rule-of-thumb. Enterprises of this kind collapse like houses of cards when dull times arrive, and constitute no doubt a large proportion of the four-fifths of the failures which are due to personal incompetence. Accurate knowledge of the cost of production is an absolute necessity and the detail in which it is required to know these costs grows daily with the growth of enterprises, the increase in competition and the development of new methods of management.

CHAPTER II

PROBLEMS OF COST FINDING

7. *Book-keeping, accounting and cost-finding.*—A clear conception should be had of the relation between accounting, book-keeping and cost-finding. Accounting is the science of recording transactions in terms of money, which is the measure of all commercial and productive performances. Where properly conceived it is of much wider scope than book-keeping with which it is often considered synonymous. Book-keeping is, more strictly speaking, the clerical work of recording transactions, but accounting goes farther and deduces financial statements that may serve as safe guides for the conduct of the business. Almost any one can introduce a system of book-keeping that will show the balances and general results of the business, but to lay out an accounting system that will anticipate future performances and guide the manager safely where the details are so great as to be beyond his grasp, is a different matter.

Cost-finding is that part of general accounting which deals with the finding of the detail costs which make up the general or summarized costs. It is, therefore, closely connected with shop processes and shop management, and the cost-keeper usually is placed directly under the manufacturing superintendent. The summarized findings of the cost-keeper, however, may be forwarded to the general accounting department, which is under the general manager, or perhaps the treasurer, and merged into the general accounts. The clerical machin-

ery of both departments may be so arranged that they merge properly and accurately. The installation of a cost-finding system therefore should be the joint work of the skilled accountant and the manufacturing expert.

General accounting must be conducted in practically every business, but cost-finding, in a detailed sense, may or may not be necessary, though, as before stated, it is often badly needed in many places where it is not considered necessary.

8. *Divisions of productive industry.*—To illustrate these relations consider the case of a farmer who is producing wheat, barley, oats, cattle, sheep, poultry, eggs and, in addition, operates a small truck garden where he grows a number of varieties of vegetables. Under the old methods which were practised a few years ago his farm and the labors of his family and himself would perhaps supply him with practically every need. Accounting was hardly needed, as he could see the state of his resources. But under present conditions he must buy many of his necessities; if he hires helpers they must be paid in money which can be obtained only by selling the products of his farm. He must, therefore, add to his labors as a producer both those of a buyer and those of a seller. It now becomes increasingly difficult for him to carry the records of his many transactions in his head and he must proceed to write them down in some orderly and systematic manner, thus adding accounting to his required duties. The growth of the farmer's activities also brings about added financial responsibilities to which special attention must be devoted. The essential features of productive industry, therefore, are buying, producing, financing, transporting to market, selling and accounting. In most cases buying is considered as part of producing and transportation to market

as a part of selling, so the four divisions of production are then manufacturing or growing, financing, selling and accounting.

If, now, this farmer is prosperous, he may keep only such accounts as deal with his receipts and disbursements. He will record all purchases for fertilizer, machinery, insurance repairs, drain-tile, etc., and will also record all money received from sales of produce. The balances from these general accounts will always inform him how he stands as a whole with his business world.

9. *When cost records become necessary.*—But suppose he is not prospering, or suppose he simply wishes to know what lines of effort are giving him his highest returns. He then must begin to keep an individual account with each activity into which he wishes to inquire. Many farmers, of the better informed class, now keep records of each cow or even of each hen in making economic studies of this kind. Almost instantly, however, the farmer under discussion finds that these individual cost accounts are decidedly different in character from the general accounts he has been keeping. These general accounts were accurate and he could account fully for all the items entering therein. But these individual accounts contain items that are not definite.

For instance, the same man that feeds the cattle helps to market the eggs. The insurance on the barn is charged partly to one activity and partly to another. Some of the general supplies which he has purchased spoil on his hands, other supplies are not fully accounted for because of waste or failure to obtain accurate account of its distribution. He also finds it practically impossible to accurately apportion his labors in his truck garden over the many products grown therein. He must, therefore, approximate to a certain extent in mak-

ing up these accounts. The greater the detail into which he wishes to go the more difficult it becomes to segregate the costs of the several lines of effort in which he is concerned. This particular difference between general accounts and cost accounts should be carefully noted. The general accounts *must* be accurate and must balance; cost accounts are seldom exact and it is difficult often to make their summarized totals agree with those of corresponding general accounts which are based on much more accurate statements.

If this farmer should be very progressive or of a speculative mind, he may record the relative costs of producing different products under varying conditions with a view to guiding himself in future work. That is to say, he begins to collect statistical data based on his cost accounting which will enable him to predict, in some degree at least, the results of these future efforts. This was once a secondary feature of cost accounting, but it now bids fair to be as important as the original function performed by cost-finding methods, namely that of simply finding out what the actual costs of production are.

The general principles underlying the farmer's cost records are applicable to all branches of productive industry though the methods of applying them may vary widely. The illustration of the farmer was purposely selected to show that these principles apply even to handicraft production of the simplest kind. A brief consideration of any of the handicraft callings, particularly as they grow in magnitude, will disclose analogous conditions and will assist in making clearer the more complex appearance of these principles as they appear in large modern factories. It is in the highly organized modern factory that the greatest complexity is met and the following discussion is therefore directed

largely to factory methods. The general application, however, should not be lost sight of.

10. *Application to manufacturing plants.*—One of the most marked and important characteristics of modern industry is the tremendously extended use of the principle of division of labor. While this principle is inherent in the formation of civilized society and has been used by mankind from the beginning, the modern industrial era has extended its use in a most remarkable degree. The installation of highly developed and specialized machinery has aided materially in furthering the use of this principle. The production of the smallest article may be the work of many hands. One man may plan or design it, another may make tools for its production, many others may work on individual operations, not knowing, perhaps, what sort of an article the several parts are intended for; while others, who may not have seen a single part manufactured, may assemble the completed product.

A diagrammatic outline of the essential factors in any productive enterprise is shown in Figure 1. No matter how complex the ownership of a plant may be, it can be and usually is reduced to a board of directors or some similar group which represents the owning body, and dictates the general policy of the enterprise. These directors in turn may be represented by the president or general manager who is in actual charge of the plant. They may also elect such officers as the secretary and the treasurer to serve as independent checks on the operation of the business. Under the president are departmentized the four main branches of production already noted, namely, producing, selling, financing and accounting. If the plant is owned by partners or by an individual the organization is, of course, simplified and

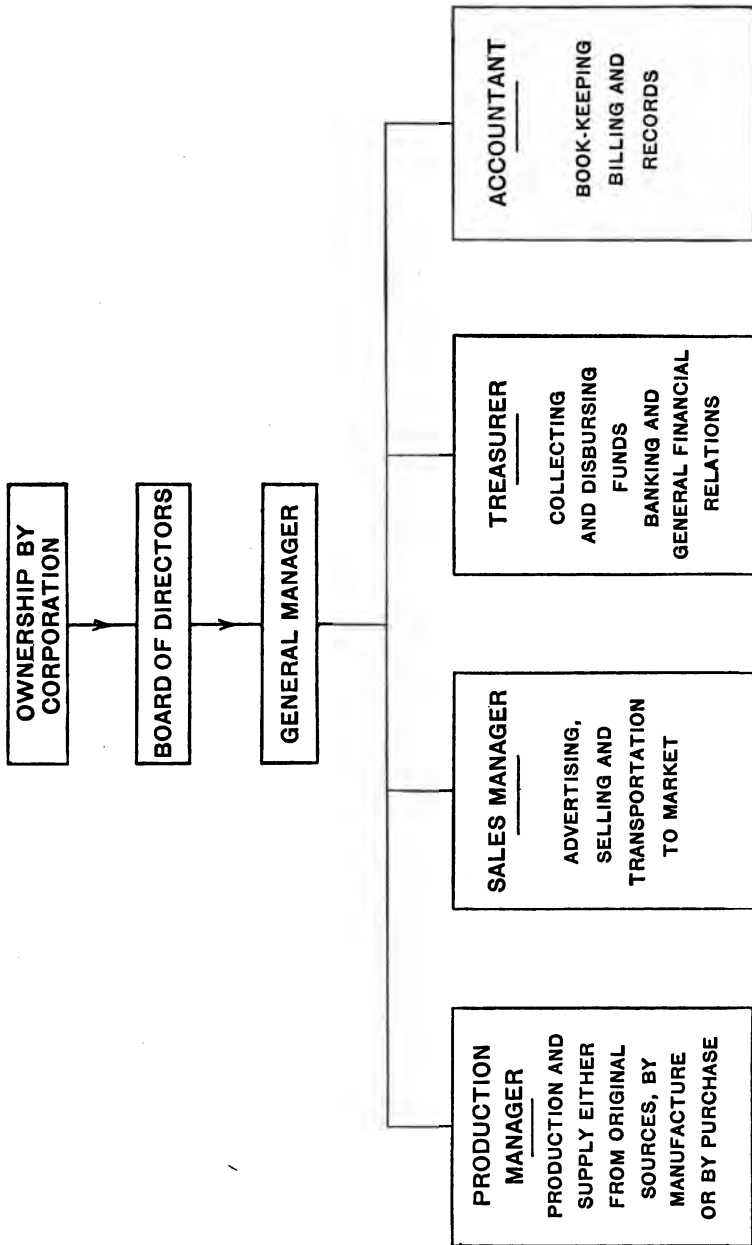


FIGURE 1—THE FOUR FUNDAMENTAL BRANCHES OF AN ENTERPRISE

where the plant is small, one individual may perform several of the foregoing functions. The general idea, however, of the four main branches should not be lost sight of no matter how much the detail arrangements of administration may vary. For instance, in some cases the engineering department is so important as to be placed directly under the general manager, but this is purely an administrative matter and does not affect the principles presented, the engineering department being strictly a branch of the productive department. It is in fact another manifestation of the advantage of division of labor. Formerly all engineering planning was done in the shop as the work progressed and often by haphazard methods. Experience has shown that better and more economical results are obtained when this work of planning is in the hands of specialists.

11. *Departments not always fully developed.*—It may be noted that the degree to which some of these departments may be developed in any one industry or enterprise may vary widely with conditions. Some concerns have only very rudimentary sales departments depending on other organizations to dispose of their product. In other cases the sales organization may be highly developed and it is not uncommon that the cost of marketing a commodity is equal to, or greater than, the actual cost of production. Other enterprises, again, may do little or no purchasing of materials except for machinery and repairs, having acquired once for all such natural sources of supply as are necessary for their purpose. Still other enterprises do no producing, in a strict sense; the purchasing department taking the place of the production department which is so prominent a feature of other industries. Thus a mercantile concern simply buys finished or marketable goods and sells them again. The

general principles involving all four functions should not be forgotten, however, and accounting, as has already been noted, must always be carried on whether the enterprise in question does either buying, producing or selling or all three combined.

12. *Division of labor.*—As a factory grows in size, or the scope of the work broadens, the economic advantage of the use of division of labor naturally brings about departmentization. Departmentization is also desirable from the standpoint of administration—and the entire problem of cost-finding is closely connected with the problems of organization. A diagrammatic outline of the several departments of a typical manufacturing enterprise, showing the relative position of the several departments, from an administrative standpoint, is shown in Figure 2. The four main divisions, financing, selling, producing and accounting are functionalized under the general manager, in the care of the sales manager, the factory manager, the treasurer and the accountant or comptroller. Under the factory manager is organized the production department with its many sub-departments. Some of these sub-departments are functionalized directly under the factory manager while others are placed under the factory superintendent. The arrangement shown is suggestive, only, though it illustrates a somewhat common arrangement of the several departments.

It will be noted that the duties and functions of the men in the various departments are often decidedly different in character. Thus there is little in common between the work of the shipping room and the labor bureau. It will also be noted that many of the men employed do not work directly upon the product. The engineer in charge of the power house, for example, does

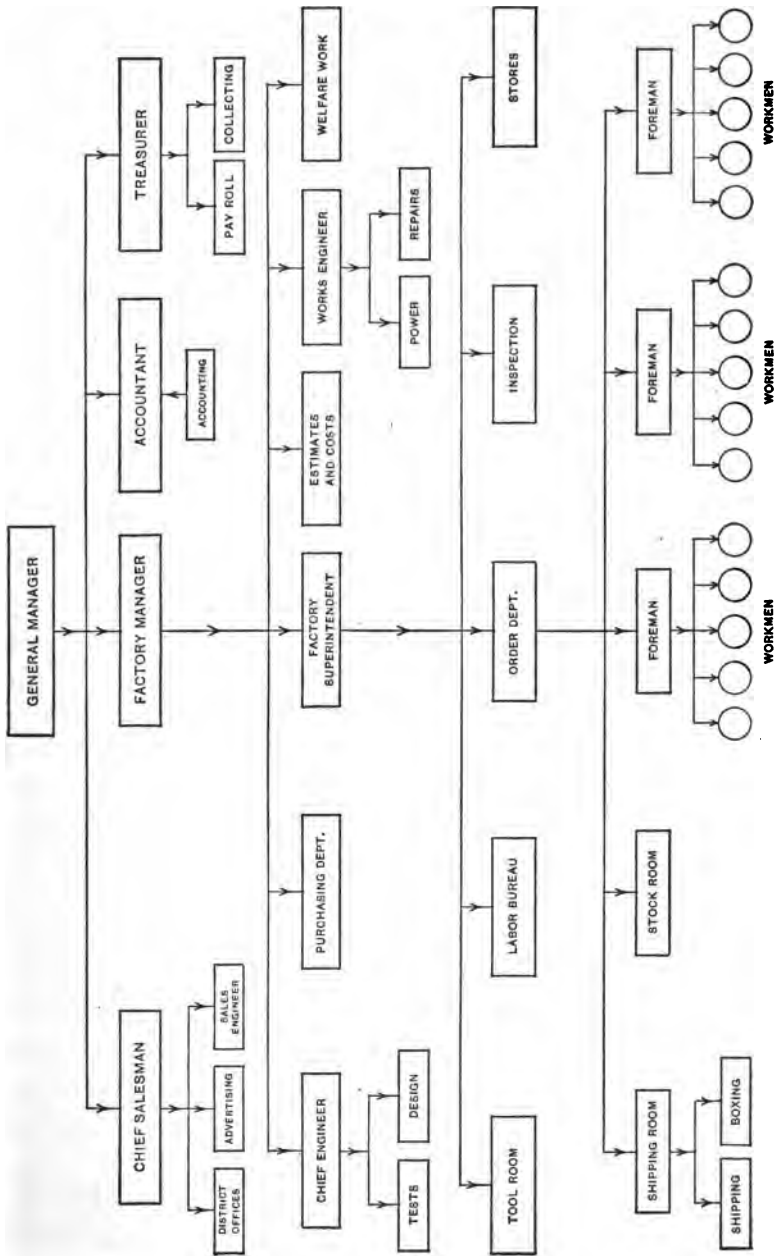


FIGURE 2—DIAGRAMMATIC OUTLINE OF MANUFACTURING ORGANIZATION

no work on the product itself and the power which his department produces may or may not be used on all products. The engineering department may make designs for some jobs,¹ while for others it may do nothing. Crane men, office clerks, errand boys, etc., are employed on work that is general rather than specific, and it is difficult to apportion accurately the amount of time that they spend on each piece of the factory product. The proportion of men that may be thus employed indirectly may be very large and the modern tendency in all mass production is to increase this proportion rather than to diminish it.

This general tendency toward departmentization and division of labor should be carefully noted by the student of cost systems. Certain fundamental principles in modern manufacturing methods irresistibly work to increase this tendency. The four primary divisions of manufacturing, namely, producing, selling, financing and accounting, are functional divisions. That is, the division is based on the *character* of the work performed. Again under the factory manager (See Figure 2), are found several departments the functions of which are different. The designing of the product is separated from the actual construction, and the purchasing is set aside as the separate function of a specialist. The separation of the planning of the work from its construction should be especially noted. Until quite recently this principle had not gone far beyond the separation of the engineering and the construction departments. But recent developments tend to carry this principle of the separation of the planning and the constructive functions much farther down into the shop itself. Such a

¹ The author feels that no apology is needed for the use of this homely but expressive term. There is no other word that fully takes its place.

separation of functions always increases the amount of general or indirect labor and decreases the amount of specific or direct labor that is put upon the product. As the tendency grows the necessity of more accurate distribution of cost increases while at the same time the difficulties in the way of accurate allocation of cost elements also become greater; all of which points to more refined cost-finding methods as competition becomes keener.

13. *Basic cost problem similar in all industries.*—It will be noted, therefore, that the problem of cost-finding in the factory is little different from that of the farmer previously discussed. The difference is one of degree rather than of principle. Competition has, however, compelled the factory owner, in general, to look more closely into his costs; the agriculturist will soon be compelled by the same economic pressure to do likewise.

14. *Compared with general accounting.*—The problems of cost-finding will be more clearly understood, also, by considering certain other characteristics of manufacturing industry. As before noted, the general accounts indicate the general condition of the business and should also, if properly conducted, indicate the general tendencies. Figure 3 shows a typical monthly statement of the affairs of a manufacturing company. In it the condition of the assets and liabilities of the company have been summarized at the time considered. Among the so-called permanent assets are found such items as buildings, machinery and tools, drawings and patterns, shop furniture and fixtures. These assets are not permanent, however, in the sense that their value does not change. As a matter of fact, they are constantly being added to and are constantly depreciating in value either from use or decay. Much of the labor expended in the con-

MONTHLY STATEMENT. BROWN MFG. CO.							
	MARCH 31, 1913			APRIL 30, 1913			
	DR.		CR.	DR.		CR.	
PERMANENT ASSETS							
REAL ESTATE	60	500	00				
BUILDINGS	200	225	00				
MACHINERY AND TOOLS	150	345	00				
FACTORY FURNITURE	7	240	00				
OFFICE FURNITURE	2	100	00				
DRAWINGS AND PATTERNS		100	00				
TOTAL	420	510	00				
CURRENT ASSETS							
CASH	7	241	52				
STOCKS AND BONDS	2	500	00				
NOTES RECEIVABLE	1	250	50				
ACCOUNTS RECEIVABLE	75	240	80				
RAW MATERIALS	40	264	18				
MATERIAL IN PROCESS	50	146	15				
FINISHED PRODUCT	20	240	24				
GOODS ON CONSIGNMENT	5	140	10				
DEFERRED CHARGES	1	240	00				
TOTAL	208	262	99				
PERMANENT LIABILITIES							
FUNDED DEBTS							
MORTGAGE BONDS			10	000	00		
MORTGAGES			5	000	00		
TOTAL			15	000	00		
CURRENT LIABILITIES							
NOTES PAYABLE			85	000	00		
ACCOUNTS PAYABLE			52	248	15		
PAY ROLL			8	218	16		
TAXES ACCRUED			1	240	12		
INTEREST ACCRUED				400	20		
RESERVE FUNDS			1	240	14		
TOTAL			98	844	77		
NET WORTH							
CAPITAL STOCK							
COMMON			375	000	00		
PREFERRED			100	000	00		
SURPLUS AT FIRST OF YEAR			21	245	16		
NET PROFIT TO DATE			19	188	06		
TOTAL			515	428	22		
GRAND TOTAL	628	772	99	628	772	99	

FIGURE 3

struction and repair of these utilities is the work of men in the regular employ and much or all of the material used passes through the regular channels of purchase and storage. Some of these expenditures of labor and material, however, are expenditures on the capital account and add to the value of the assets. They must not be confused with the manufacture of product for the market. Cost-finding, therefore, is concerned with, and must take account of, many other things beside production for the market.

Again on the monthly statement is found the value of material and apparatus, finished and in process; that is, the value of all raw or unworked material, the value of all material passing through the shop and partly worked into finished product and the value of all material fully completed and in the stock-room. Obviously the general accountant has no place in his books for the myriad detail accounts occasioned by the constant flow of material through the shop. Yet it is important that this information be at hand periodically and it must be correct if it is to be of any use. Formerly it was considered sufficient if the balance sheet were drawn off yearly and the items under discussion were obtained by actual, visual appraisal. While such an appraisal is still a very valuable procedure as a check, every modern accounting system requires a monthly statement like Figure 3, and some of the items shown can be obtained only through a cost-finding system that keeps constant and accurate account of all movements of material and expenditures for labor. The cost-keeper carries on a separate account with each individual factory order, recording its increasing value as it progresses. When the accounting period arrives he adds up his accounts, checks the balances against the total value of material

issued from stores and the labor expended, and reports the total amount to be transferred from "material" to "work in progress" and from "work in progress" to "finished product."

15. *Functions of cost-finding summarized.*—It appears, therefore, that the requirements of a good cost-finding system extend far beyond the problem of finding the cost of marketable product. Its function as a means of predicting future performance has already been noted and to these may now be added the third function; namely, it should serve as a basis of managerial reports. Summarized, these requirements are:

- (a) To record the results of operations.
- (b) To serve as a basis of prediction for future operations.
- (c) To serve as a basis of managerial reports.

The last two items will be discussed in a later section and the discussion for the present will be confined to the first item. The relation that should exist between the general books and the cost books will be clearer after a discussion of the problems of cost-finding and this topic will also be deferred to a later section.

16. *Elements of factory cost.*—From the foregoing it is clear that the cost of any manufactured article is a complex quantity. The manufacturer buys supplies which he classifies as raw or unworked material. On this material a certain amount of actual labor is performed by his men. Obviously it is not difficult to obtain a fairly accurate account both of the cost of the material used and of the actual labor bestowed upon it, since these two elements of cost are paid for directly in money. But, in addition, it appears from Figure 2 that many others must be employed who do not work directly upon the product, yet the wages of these men are certainly a part

of the cost of production. In addition, also, to the material that goes directly into the product there is much material that must be used to carry on the work, though it does not enter into the product. Thus coal, oil, waste, etc., are chargeable against production, though not entering into the product directly. And, finally, there are many other items of expenditure, such as insurance and taxes, that are neither labor nor material, but which must be included in the completed cost, though they cannot be connected directly with any particular piece of product.

17. *Direct and indirect material.*—Material which enters directly into the product is known as direct material or more simply as material. All material which is chargeable against production, but which does not enter directly¹ into the product is called indirect or expense material.

18. *Direct and indirect labor.*—Labor which is expended directly upon the product is called direct labor, productive labor or, more simply, labor. All labor chargeable against production, but which cannot be connected with some particular piece of work, is called indirect or non-productive labor. The terms “direct” and “indirect” are much preferable to “productive” and “non-productive.” All labor is productive, strictly speaking, though it may not be expended directly on the product.

19. *Burden or expense.*—It is not difficult to allocate the direct labor and direct material which goes into any piece of product, but it is exceedingly difficult,

¹ Occasionally material enters directly into production in such small quantities as to make accurate accounting impracticable. Thus glue, screws, nails, etc., may be used directly in production but not in quantities large enough to bother about so far as any one piece of product is concerned. They are then treated as indirect material.

often, to charge each piece of product with its correct share of indirect material, indirect labor and the other items of expense not directly connected with production, such as clerical salaries, insurance, etc. All these indirect charges are, therefore, usually gathered into lump sums, as will be described hereafter, under the name of burden, overhead expense or, more simply, expense. The great problem of cost-finding is to properly and justly distribute this burden or expense over the product so that each article shall bear its own share and only its own share of expense.

20. *Indirect functions.*—The cost of the selling department and accounting departments are of the indirect kind, and hence are included in the expense. But as has been noted these functions are independent of production, are under their own officers, and the latter should be held strictly accountable for their own expenditures. The manufacturing superintendent should be held accountable only for the costs of actual production and the cost books should show the relative proportions of expense chargeable to each department. Expense, therefore, is divided into manufacturing or factory expense, administrative or office expense and selling expense. In many instances the administrative expense is small compared with the selling expense and they are grouped together under the name of general or commercial expense. It will be assumed for the present that this grouping is sufficiently accurate for the discussion following, but the general principle should be borne in mind. It is often highly important that the cost of the sales should be carefully separated from the administrative or office expenses in order to locate expenditures accurately and to fix responsibility beyond question.

21. *Elements of total cost.*—It appears, therefore, that

the most natural primary divisions of manufacturing cost are direct material, direct labor and manufacturing or factory expense. It is often customary to omit the qualifying word and speak of direct material and direct labor simply as material and labor. The sum of the direct material and the direct labor is known as the flat or prime cost. The sum of the prime cost and the factory expense is the shop cost known also as the factory

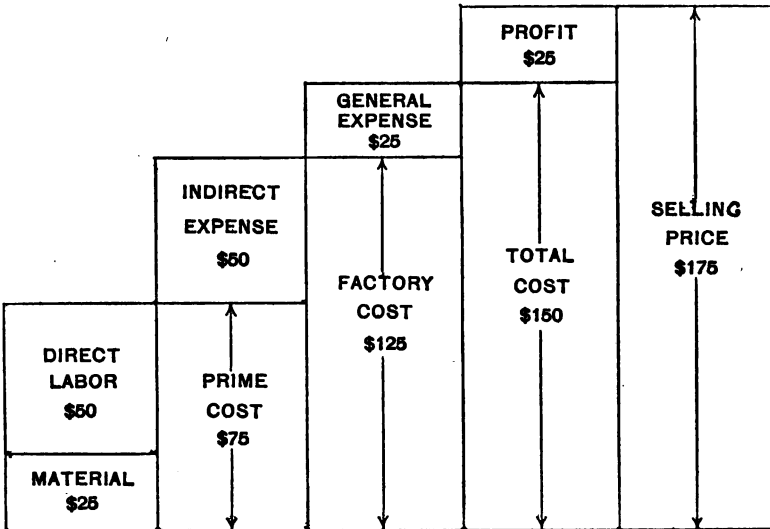


FIGURE 4—ELEMENTS OF MANUFACTURING COST

cost or manufacturing cost. The factory cost includes all expenditures for which the manufacturing superintendent is held responsible. The factory cost includes, therefore, all items properly chargeable against the product up to its delivery upon the shipping floor or to the stock-room depending on its destination. The sum of the factory cost and the general expense is the total cost and the total cost plus the profit is the selling price.

Naturally the relative proportions of these several

items will vary with the enterprise. In Figure 4 the relation of these items is shown graphically, and while the figures are taken arbitrarily, they are suggestive of the relative proportions found in general machine production.

The items included in the total cost of production are necessarily fixed by the nature of the product, the processes of production, the efficiency with which the works are operated, and the cost of marketing the product. Profit, on the other hand, is somewhat arbitrarily fixed, but is closely connected with the volume of business transacted, a feature that is often lost sight of. Suppose, for instance, that the total cost of the product for one year is just equal to the amount for which the business is capitalized, and on which it is desired to pay, say, 6 per cent profit. Obviously, if the total cost of production is increased by 6 per cent in order to fix the selling price, this object will be accomplished. On the other hand, if the total cost for the year is small compared with the capitalization, the percentage to be added must be increased proportionately; while if this total is great compared with the capitalization it can be reduced in like ratio. The value of the output per dollar of inventory is, therefore, a very important matter. It is not sufficient that the material and labor value of all product be low. The volume of the output must be sufficiently high so that the profit which must be added will not bring the selling price above market conditions.

22. *Methods of adding profit.*—The method of adding the profit to the total cost as a percentage on that amount should be carefully noted where it is desired to use the selling price, instead of the total cost, as a measure of the profit. Suppose, for instance, that the total cost is \$100 and it is desired to make twenty per

% of total cost

cent on the sales price in order to realize the proper returns on the capital invested. If twenty per cent of the total cost is added to the total cost the selling price will be \$120 and the profit will be \$20, which is not twenty per cent of the selling price. If, however, twenty-five per cent be added to the total cost the selling cost will be $100 + (.25 \times 100) = \125 . The profit will be \$25, which is twenty per cent of the sales price, and the profit will be correct in its relation to the desired returns on the investment. Operations of this kind involving percentage should be carefully considered, for they are a fruitful source of error and loss. Obviously it is simpler and safer to make these calculations, using the total cost as a basis of computation.

CHAPTER III

IDENTIFICATION OF COSTS

23. *Classification of accounts.*—From the foregoing it is obvious that cost-finding is concerned with two kinds of accounts. Those that have to do with the actual production are constantly changing, a new account being opened with every new undertaking and closed with its completion. On the other hand, the accounts that have to do with repairs on buildings, maintenance and repairs of equipment, and similar matters are permanent in their character continuing as open accounts so long as the enterprise lasts. The same is true of expense, labor and material which cannot be allocated to some particular piece of work. They are expenses which flow, so to speak, constantly, without change in their characteristics.

The first step, therefore, in establishing a cost system is to make a careful classification of these accounts. This classification will, necessarily, conform in its general outlines to the manner in which it is desired to have all transactions appear in summarized form in the general accounts, and also to the character of the statistical information which it is desired to collect. This classification¹ will also necessarily vary in character and detail depending on the size of the enterprise and the character and variety of its product. The classification for a mercantile establishment will not be quite the

¹ For examples of such classifications see "Factory Organization and Costs," by J. Lee Nicholson, p. 203, and also "The Science of Accounting," by H. C. Bentley, p. 85.

same as that for a factory manufacturing machinery. The following is a typical classification of the general ledger accounts as found in enterprises of the latter class with a few of the characteristic sub-headings to show the kind of charges belonging under each heading. A more comprehensive list is used by large manufacturing enterprises. The monthly statement, Figure 3, is, of course, a summarized statement of these accounts arranged so as to show the totals of the several classes with as little detail as may be desirable.

LEDGER ACCOUNTS OF A MANUFACTURING ESTABLISHMENT

ASSETS

PERMANENT ASSETS	CURRENT ASSETS
Land	Cash
Buildings	Notes receivable
Machinery and equipment	Accounts receivable
Office equipment	Securities owned
Patent rights	Treasury stock
Deferred charges	Consignments
Development expenses	Finished product
Interest prepaid	Goods in process
Advertising prepaid	Unworked material
Organization expenses	Factory supplies

LIABILITIES

PERMANENT LIABILITIES	RESERVE FUND
Mortgages payable	Doubtful accounts
Bonds	Depreciation

CURRENT LIABILITIES	NET WORTH
Accounts payable	Capital stock, common
Notes payable	Capital stock, preferred
Accrued interest	Surplus
Accrued taxes	Profit and Loss

REVENUE ACCOUNTS

Sales of product	Miscellaneous income
	Sales of by-product

EXPENSE ACCOUNTS

MANUFACTURING EXPENSES

Indirect labor	Repairs
Factory clerical wages	Insurance
Factory supplies	Taxes
Depreciation	Etc., etc., etc.

SELLING EXPENSES

Salesmen's salaries
Traveling expenses
Agents' commissions
Advertising
Postage (used in selling)
Freight
Cartage
Incidentals

ADMINISTRATIVE EXPENSES

Officers' salaries
Officers' expenses
Directors' fees
Clerical wages
Office supplies
Office rent
Postage
Legal expenses

24. *Information from general accounts.*—It is obvious that the above ledger accounts or controlling accounts are necessarily fed from many sources. Thus if a piece of land or a new machine is purchased the transaction does not pass through the manufacturing organization but is conducted directly with the real

estate agent or the machine builder. The purchase price is added to the proper account under permanent assets and the cash account, if it be a cash transaction, is lessened by the corresponding amount. If, however, the machine should be built in the shop, as is often done, a quite different procedure is adopted and care must be exercised that the correct cost of manufacture is obtained. If proper sales prices are to be fixed the cost of every article manufactured must be ascertained, and if the general accounts are to be balanced frequently the value of all material—finished, in process and in the raw state—must also be evaluated frequently. If the enterprise is small all of these requirements can be met by the accounts of a single general ledger, the detail items under each account being consolidated so that they can be so handled. But as any establishment grows it becomes increasingly necessary to go into greater and greater detail and subsidiary ledgers are opened to handle this detail, the summarized statements of which may be carried to the general ledger. Thus it is often desirable, as explained in the text on "Accounting Practice," to open a ledger for accounts receivable and one for accounts payable. The cash transactions are often kept in a separate cash book and a separate ledger may be necessary to keep proper account of the machinery and equipment. The number and character of these auxiliary ledgers will depend entirely on the size of the business and the character of the output.

25. *Separate cost records.*—When, therefore, the details of the cost of the product become too voluminous for the general books a separate account or cost-ledger is opened. Just when such a step is necessary cannot be definitely fixed, but depends again on the circum-

stances of the business. There is a general tendency, however, to separate the cost-finding system from the general books, even in certain kinds of small plants, for reasons that will presently appear. The extent to which this is necessary is also much affected by the character of the manufacturing processes and the consequent organizations of the enterprise. Manufacturing plants may be divided, broadly speaking, into two kinds, namely:

(a) Continuous process industries.

(b) Intermittent or interrupted process industries.

26. *Continuous process industries.*—In a continuous process industry of the extreme type some natural product or products are passed in a steady stream through a process or sequence of processes. The raw material goes in at the receiving end of the plant, is worked continuously, and appears as finished product at the shipping end of the plant. Thus a cement plant is supplied with a constant stream of the necessary ingredients, passes them through the same processes and produces a uniform product so far as appearances, at least, are concerned. Ore-refining plants, oil refineries, salt works and saw-mills are examples of this kind of industry.

Such an industry may be either analytical or synthetic. That is, it may take some natural product and separate it into component parts, as in the case of ore refining or of industries turning out products made from salt; or it may take raw materials and build them up synthetically into other products, as in the case of a paint works. Most usually such factories handle only a few materials and these are in very large quantities.

In the extreme case where the processes involved are

not numerous and the quantities handled are vast and of few kinds the cost-finding is very simple. All that is needed is the cost per unit (yard, pound, or ton, as the case may be) and this involves only a record of the output for the period considered and a record of the labor, material and expenses incurred for the same period. If the value of the material in process is not great the unit cost can be ascertained accurately enough by dividing the summarized labor, material and expense by the output for the period selected. If, however, the value of the material in process is great, allowance may have to be made for this value, especially if the rate of production varies. Clearly the cost-finding even in such cases need not extend beyond the general books and in these simple cases it is not necessary to keep the expenses of production in any great detail since these expenses are necessarily distributed uniformly over the product.

There are often administrative reasons, however, for keeping detailed costs even in these simple cases. Thus in some continuous industries it is desirable to know the cost of production by departments or processes; or, the plant may be producing several articles continuously, each article passing through the same departments. In such cases simple division of the summarized cost, as already indicated, may not suffice and cost-finding methods apart from the general books must be resorted to.

27. *Intermittent process industries.*—At the other extreme are industries that manufacture a variety of products and a comparatively small number of each variety. A ship-building and repairing plant is a good example of this extreme type. Here duplication of an order is not frequent and the greatest diversity of prod-

uct is met with, both as regards character and size. Obviously only cost-finding methods that take account of the labor, material and expense that justly belong to each job are adequate in such cases. The degree of detail into which it is necessary to carry the cost-finding methods will, of course, vary greatly with the character of the work, but, obviously, no simple averaging methods, such as have been discussed, will give even approximate costs in such cases. The various items of shop expense fall with varying weight on the many articles made, and, while it is not difficult to allocate the material and labor actually used on any contract, the distribution of the indirect expenses is a difficult problem.

28. *Combined intermittent and continuous factories.*—Between these two extremes are found many enterprises that employ both intermittent and continuous processes to a greater or less degree. Thus a large electrical machinery factory may build large sized generators, motors or transformers to order only and seldom in lots of more than three or four. On the other hand, it may also build large numbers of small motors or transformers, these articles not being in continuous production, but passing through in large lots as needed. Large numbers of finished parts may be made at any one time and stored in the store-room to be assembled as desired. Again certain processes such as annealing and dipping in insulation may be in constant operation like a continuous process, though all the sheet steel passing through may be handled and identified as belonging to certain specified lots and intended for specific jobs. The porcelain works of such a factory, if making porcelain parts of approximately the same size, might very well be treated as a continuous industry and

the cost of its output may be computed by the unit plan as in the extreme continuous industries discussed above. The same procedure might be followed in the foundry, if the manufacturing conditions were analogous and no great variation in the size and character of the product existed.

Obviously the conditions in such a factory are complex, and the cost system that will be adequate for such a place needs careful consideration and may include characteristics of more than one method of cost-finding. Clearly, also, no single method of cost-finding is applicable to all kinds of industry and many practical modifications must often be made in cost-keeping theory in order to obtain a workable system. In many cases exact results are not obtainable because of such complexities. There are, however, certain fundamental conceptions that are helpful in all cases.

29. *Relation of cost-finding to administration.*—It is almost obvious that, where a factory is highly departmentized as in Figure 2, special means must be employed to co-ordinate the work of the several departments and to insure that correct information goes to the right persons and to those persons only. Clearly, also, such information cannot be carried verbally, but must be transmitted by means of systematic blanks and printed forms. Clearly, also, the amount and character of the "system" used will vary widely with the character of the industry, the size of the plant and its particular form of organization. The card or form that will be excellent for one factory will be useless for the same purpose elsewhere. No effort is made here, therefore, to illustrate such forms or blanks except as is necessary to illustrate general principles. If the purpose of the blank can be clearly determined the exact form of the ruling and printed con-

tent is clerical work only; though, of course, much valuable information and assistance can be obtained from the collections of such documents which are found in specialized books on cost-finding and accounting.

Even where the cost-finding system is elementary, and does not extend beyond the general books, it is important that the blanks and forms used in administration be made with the cost system in mind. Much valuable time is often wasted in copying and recopying instructions or records that should appear in the required form as a natural result of the system. When, however, the detail costs required are such as to warrant the employment of a cost-keeper, and the opening of special ledgers such as the stores-ledgers and the cost-ledger, the forms and blanks used must cover thoroughly the system introduced. The manufacturing superintendent is concerned with placing proper orders for producing machines. The cost-keeper is concerned with the detail in which these orders are given, since on the detail in which the order is given must rest the detail in which his costs will be recorded. The set of forms therefore should serve both purposes, namely of carrying the correct information as to the method of doing the work and at the same time segregating operations in such a manner as to allow the recording of intelligent costs.

30. *Two classes of blank forms.*—A big manufacturing enterprise may employ a very large number of these blanks and forms and to the uninitiated this vast array is often very confusing. It will assist materially in understanding such complex systems if these blanks are classified into

(a) Orders, or instructions as to how work is to be done.

(b) Returns, or records of how work has been performed.

Under orders may be classified all instructions or advice emanating from all departments and officials that are charged with directing the work. Thus the drawings and specifications issuing from the drawing room and the information regarding shipping dates and destination of product, may be regarded as orders just as much as the specific orders that must be given to a mechanic regarding a particular piece. It may be further helpful if these orders are considered as moving downward in Figure 2 over predetermined paths, each one carrying its information accurately to the right parties and to them only. In large organizations it is now common to make such a chart as Figure 2 and lay out such paths; also to specify the character of the orders that are to move along each one. Figure 9 illustrates a production order issued by the order clerk (Figure 2), instructing the foreman of some department, perhaps, to proceed with some operation. The production order carries the number, letter or other characteristic which identifies the work, whether it is a lot of machines, a single machine, or a part of a machine and, obviously, the detail in which it is made out will also govern the detail in which the returns can be made.

Returns include all statements which record the results of operations, records of material used, whether for direct product or for supplies; also records of time expended and wages paid. Under returns may also be included all summarized reports and similar documents. These returns have their origin where the work is being done and where material is being drawn from stores and worked into finished product. It may also assist in visualizing these matters if returns are considered as

moving upward from the points where the actual operations are performed, being constantly consolidated into briefer statements till they are merged into the general books and general consolidated reports. Figure 12 shows a typical work card on which may be recorded the amount of time expended on any given operation and the rate of pay which the operator is to receive. This card, of course, bears the order number or letter which has been assigned to this particular operation and piece and is, therefore, a basic factor in cost-finding whether it refers to a lot of machines or a minute detail of any one of them.

31. *Necessity of identifying work.*—If costs are to be obtained, whether of large lots of machines, or of a single machine, or of each part of a machine, some means must be provided for identifying the lot or machine or part. No two machines or parts may bear the same distinguishing mark and if many thousands of pieces are passing through the works at any one time it is obvious that some system must be adopted that will be capable of great expansion without danger of repetition. Furthermore, constant reference must be made to the several departments of the factory. To write the names of these departments out in full would take too long and would be a waste of labor. It is customary, therefore, to refer to departments by number or symbol. Again in making up shop orders it is necessary to specify the operations or sequence of operations on each piece. This may also involve reference to tools and equipment. In a large works the tools and equipment may be many and diverse, including many special jigs, fixtures and the like, and the number and character of the operations performed may also be many and varied. The materials used may also be of many kinds and since constant refer-

ence must be made to them, they also may be the subject of abbreviated nomenclature. With the constant and rapid growth of the methods of planning all operations in advance, as advocated by modern efficiency engineers, these last items assume great importance in factory administration. The more accurately all machines, operations and materials are identified the more accurately can productive costs be allocated. The laying out of a good system of identification is, therefore, a necessity whether viewed from the standpoint of operating administration or of cost-finding.

82. *Mnemonic symbols.*—There are several identification methods now in use. In many places the departments are known and referred to by simple letters, thus, A, B, C, D. Where only a few departments are to be handled this method is adequate. If the departments are numerous and it is desired to apply numerical identification to other lines a system of mnemonic symbols are often employed. Thus the letters T A might be used to indicate the transformer assembly department, the letters S M might indicate the screw machine department, and so on. Similar abbreviations are in common use to indicate the materials used. Thus C I indicates that the part is of cast iron; M S, that it is of machinery steel.

The problem of identifying operations is a little more complex. If only a few operations are in use mnemonic symbols are adequate and are often used. Thus T N may signify turn, B O may mean bore, G R may signify grind, and so on, each enterprise compiling symbols suited to its own operations. Sometimes this is obviated by printing all the operations on the side of the cards which give instructions or record returns as illustrated on the work card, Figure 12, in such a manner that they

may be indicated by a check mark. This method also saves writing, but its use is limited, obviously, to industries involving standard operations.

The problem of identifying departments or operations is, in general, an easy one compared to that of identifying the product and parts of products, particularly in large works doing a wide range of work. In factories which make a large product, such as large steam engines, and where a comparatively small number of machines are in production at any one time, mnemonic methods are also sometimes used. Thus in some shops of this character the term "Osp" might be used to designate all drawings for an engine built for a certain hospital and each drawing might bear this symbol followed by a serial number which locates the drawing in the series belonging to that engine, the drawing serving as a basis for production orders and cost charges.

33. *Drawing numbers.*—In large factories with diverse product, however, these simple methods of identifying machines and machine parts fail completely and identification must usually be made to rest upon a carefully arranged system of so-called drawing numbers. In a very large works where many thousands of drawings are made yearly, this necessitates a careful consideration of the entire manufacturing problem and, perhaps, the separation of the product into distinct classes. Here mnemonic or in fact any system of symbols based entirely on letters is usually inadequate or too cumbersome, and numbers or combinations of numbers and letters are used. Thus the symbol K 24689 might, in such a system, identify the drawing of a generator spider, the letter indicating the class of product and the numerical part indicating its place in the series. Sometimes, again, all drawings are numbered serially and an index

is kept by machines so that the drawing of any part may be found by looking first at the index of drawings that were used in making the machine and finding the serial number of the particular drawing on which the part would be found. Sometimes, again, a numbering system based on the Dewey decimal system of classification is used, certain blocks of numbers being set aside for certain classes of machines or product. Thus all numbers beginning with .012 might indicate transformers and all numbers beginning with .013 might indicate oil switches. In practice the decimal point is omitted for convenience, and the integers in the number are always preceded by a cypher. The Dewey system has the advantage of unlimited expansion without repetition and can be made as comprehensive as may be desired and, hence, may be desirable in large works. The system that is best for any one shop may not apply to others, however, and each case requires special study so that the system may be comprehensive without being cumbersome.

Whatever the general method of classifying the drawings, each drawing may carry more than one part, though in some systems only one part is put upon each drawing. Where more than one part appears on a sheet it may be identified by a part letter. Thus, in such a system, K 24689-A might signify part A on drawing 24689 of the class of product indicated by K. This identifies the part beyond question, making it possible to charge with accuracy all labor and material that enters into its production.

34. *Drawing lists.*—In most well-organized shops, using methods of this kind, the engineering department originates the directions governing the constructive features of the work and turns over to the construction department full drawings and specifications in such de-

tail that every part may be identified, not only during actual construction, but for all time so long as the drawings are existent. In highly developed systems a drawing list, Figure 5, accompanies the drawings and specifications. Such a list constitutes a complete inventory of the parts that are to be made and is an index to the drawings and lists, where the parts may be found in detail. Thus in Figure 5 the number of the drawing and the part or piece number is listed, the material of which the part is to be made is noted, and the number of parts required is given. Reference is also made to the engineering and other special specifications that accompany the drawing. Figure 5 illustrates a system based on the Dewey decimal method for numbering drawings, but using a combination of letters and integers for other documents such as tabulated data and engineering specifications.

.It will be noted that such a method allows the free and convenient use of any one part in the construction of any machine whether designed originally for it or not, since identification is complete. Thus in Figure 5 the armature and field are taken from one series, while the shaft and bearings are taken from other series, while still other parts have been made originally for still other classes or sizes of the same type of machine.

The nomenclature given in Figure 5 has been taken at random, but it is a probable combination. In well standardized production such lists may be printed in outline and the data filled in by hand. Thus in Figure 5 the data that would be so filled in is indicated by script. It will be evident that the shop orders governing the production of the machines, as a whole or in part, as the case may be, and the shop returns recording the details of such production, can be made out with assurance that,

DRAWING LIST						NO. 4	
MACHINE	TYPE	CLASS	VOLTS		DATE		
<i>Generator</i>	<i>M.P.D.</i>	<i>10-400-650</i>	<i>2200</i>		<i>4-11-1914</i>		
NAME OF PART	DRAWING NO.	PATTERN NO.	PART NO.	NO. OF PARTS	MAT-ERIAL	DATE ADDED	DATE CHANGED
MACHINE COMPLETE	<i>012</i>						
" OUTLINE	<i>0121</i>						
ARMATURE COMPLETE	<i>0122</i>						
" DIAGRAM	<i>0123</i>						
" FRAME	<i>0124</i>		<i>a</i>	<i>1</i>	<i>CI</i>	<i>8-29-12</i>	
" PUNCHING	<i>0125</i>		<i>B</i>		<i>no 2 S</i>		
BASE	<i>0034</i>		<i>a</i>	<i>1</i>	<i>CI</i>		
BEARING	<i>0035</i>		<i>B</i>	<i>2</i>	<i>CI</i>		
BRUSH							
BRUSH HOLDER							
STAND							
STAND SUPPORT							
STAND BRACKET							
STUDS							
YOKE							
CABLE							
FOR FIELD							
COUPLING							
COLLECTOR	<i>Table P468</i>		<i>m</i>	<i>2</i>			
CONNECTION BOARD	<i>Table R246</i>		<i>n</i>	<i>1</i>			
COUPLING	<i>Table n428</i>		<i>R</i>	<i>1</i>			
FIELD SPIDER	<i>0126</i>		<i>a</i>	<i>1</i>	<i>SC</i>	<i>8-24-13</i>	
RING	<i>0127</i>		<i>B</i>	<i>1</i>			
JACK SCREWS	<i>Table S26</i>		<i>a</i>	<i>2</i>			
LAMINATED POLES	<i>0128</i>						
PULLEY	<i>Table 48</i>		<i>R</i>	<i>1</i>			
RAILS							
SHAFTS & KEYS	<i>0346</i>		<i>a</i>	<i>1</i>	<i>ms</i>		<i>8-16-13</i>
SPOOL COIL	<i>0267</i>		<i>B</i>	<i>1</i>			
STANDARDS & CAPS	<i>0436</i>		<i>C</i>	<i>2</i>			
WRENCHES							
<i>Armature Shields</i>	<i>0074</i>		<i>B</i>				<i>9-12-12</i>
<i>Sub base</i>	<i>0346</i>		<i>a</i>				
<i>Wooden base frame</i>	<i>0014</i>		<i>C</i>				
LIST OF CASTINGS				<i>00</i>			
ARMAT. WIND. SPEC.	<i>a4684</i>						
FIELD WIND. SPEC.	<i>B2678</i>						
ENGINEERING NOTICE	<i>m46</i>						

FIGURE 5

so far as identification is concerned, the correct labor and material charges will be recorded against the cost of the part concerned.

35. Mnemonic and number systems compared.—The relative merits of mnemonic symbols and numerical identification may be noted. No doubt in cases where the number of items is small and where it is desirable to remember departments or operations the mnemonic system is useful. For this reason it is often used to identify departments and operations. It is used also to identify expense orders. Thus all charges against buildings can be carried in account B, and all charges against power, heat and light against account P. H. L. In large factories, however, where it is necessary to separate the expense into many items, it becomes necessary to use numbers. Thus the labor report, Figure 23, lists the expense by numbers, while the direct labor is charged against the letters which identify the several classes of product.

Obviously the degree of detail needed in the nomenclature of a factory depends entirely upon the character of the enterprise. In simple, continuous industries it may be very simple, while in large, intermittent industries it may be necessary to go to all the foregoing detail. Whatever system is adopted it should identify each part beyond a doubt and it should be capable of extension as the industry expands. To change the system of nomenclature and identification is always a troublesome problem and one that often can be avoided by a little foresight.

It is important to have these principles clearly in mind, since upon them rest the methods used in collecting the material and labor charges whether against the job as a whole or against any detail. The need of such detailed

methods of identification will be clearer after a discussion of the principal items with which cost-keeping is concerned, namely, material, labor and expense; the three succeeding chapters will be devoted to a further discussion of these factors.

CHAPTER IV

PURCHASING AND STORING MATERIAL

36. *General.*—The first step in the production of any article is that of obtaining the necessary materials. All industrial effort is concerned with the transporting of natural materials and their transformation into other forms in which they are more serviceable. Material in the natural state usually possesses potential value only. As labor is bestowed upon it the material rises in value, and in fact, practically all industrial values are principally labor values. Thus a pound of iron ore in the side of a hill has potential value only and may be bought for a fraction of a cent. This same iron ore when smelted into cast iron may be worth a cent per pound; when manufactured into Bessemer steel it may sell for one and one-half cents per pound. If made into crucible steel it may be worth sixteen cents per pound, and if made into watch springs it will be worth many dollars per pound. This is true in a general way of all manufactured products; industrial values being largely accumulated labor values, the value of the material in the original, natural state being a small part of the final value.

In the great majority of industrial pursuits the production of marketable products is divided into many stages, only a limited number being performed in any one plant. In a few cases, such as cement works and salt works, the transformation from the natural product to the marketable article is performed in a single plant.

But in the majority of cases most market products are the results of several distinct stages and these stages may be separated widely both geographically and by characteristics. The material that is required for a large electrical works, for instance, is of tremendous variety and gathered from many sources. Practically all of it, however, has had more or less labor expended upon it before transportation to the factory. The articles which one manufacturer looks upon as finished product may be looked upon by other manufacturers as supplies or raw material, and the extent to which any manufacturer may control the sources of his supplies will vary greatly. Probably no industry exists to-day that is not dependent in some measure upon other industries for some portion of its supplies, and the extent to which it will pay any given manufacturer to engage in making what will normally be considered as supplies is an interesting industrial problem that lies outside of the scope of this treatise.

Since material represents value, just as much as cash in the safe, it would seem to be unnecessary to urge that proper supervision be exercised over all operations involving its purchase and use. It is true that in many industries where the material used is very cheap and of no personal use, crude methods of finding material costs will suffice. But, on the other hand, it is amazing to see the complacency with which some factory managers view material wastes in the factory, involving thousands of dollars, while exercising the greatest strictness to avoid the loss of a cent in cash. Wastes of this kind go on day after day in some shops, but any effort to stop them by means of intelligent supervision would instantly be met with opposition on the ground of unnecessary expense. No well-regulated enterprise, in which

the materials used are an important financial factor, can afford to be without a cost system that takes cognizance of all material from the time it is ordered until it is shipped as finished product.

37. Classification and definitions.—In a continuous industry of an ideal type the material would be used as soon as received, flowing through the factory without pause and going directly to the consumer as soon as it is fabricated. Such conditions, however, are almost impossible to attain, though closely approached in some of the simple continuous processes. In most industries the rate of sale varies with the product and season, and if prompt deliveries are to be made a stock of finished product must be carried on hand. On the other hand, materials must usually be bought in large lots in order to obtain good prices and they must often be bought in anticipation of production so as to be able to start work promptly. In shops making product to special order only, these features are not of such great relative importance; but even in these cases also, provision must be made for storing material in advance of fabrication and for storing the manufactured product until it is shipped.

Raw or unworked material is properly known as stores, and the place where it is kept is called a store-room. The function of the store-room is to act as a reservoir, between the stream of incoming material and the production department, equalizing the variations in supply and demand. Finished product ready for the market is properly known as stock and the place where it is kept is called a stock-room. The stock-room acts as a reservoir between the production department and the selling department, equalizing the variations in the demand of the market and the varying output of the

factory. A careful distinction should be made, therefore, between the terms stock and stores which are quite commonly used indiscriminately. In a small enterprise the stock-room and the store-room may be one room and under one man, but even here there are two distinct functions to be considered, and as plants increase in size a separation of these two functions becomes imperative. Material which is being fabricated is known as goods in process.

In intermittent manufacturing it is often necessary to finish up a large number of parts of machines or other products and store them away, drawing them out as needed for final assembly into a completed product. In some factories where the parts are small in size, but great in number, they are stored regularly between successive operations in order to inspect them both as to quality and quantity. Stored parts of this kind are known as finished parts, and in some factories a special section of the store-room is set aside for them and is known as a finished parts store-room. Such a store-room acts as a reservoir to equalize the variations in the manufacturing processes of the factory.

The store-room, therefore, may care for three classes of material, namely, stores or raw material which is to be fabricated and hence called also direct material, supplies or indirect material, and finished parts of product ready to be assembled into completed product. In most cases all three of these classes of material are handled by the one department. But in large enterprises it may be economy to organize separate departments to handle each class. Thus in large reduction works the ore which is to be reduced might be cared for by one stores system while the supplies necessary for repairs might be handled by a separate and distinct stores system. It

will be noted that in large enterprises of this kind the item of supplies may be very large and their issuance should, as a consequence, be carefully guarded. Technically the stock-room should carry only completed products, but in many cases the stock-room may carry a large stock of finished parts to supply repair parts to customers. In such cases, however, the finished parts so stocked are treated as finished product, whereas their status in the store-room is somewhat different, as will be seen.

The accountant and cost-keeper are interested, therefore, in the following transactions as the material is fabricated:

- (a) Purchasing of material.
- (b) Recording and storing of raw material.
- (c) Issuing of material to the production departments.
- (d) Recording progress in manufacture.
- (e) Recording the finished product.

38. *Purchasing material.*—It is obvious that the character and quantity of the materials needed grow directly out of the needs of the enterprise and cannot, in general, be specified by the purchasing agent who is usually simply an expert buyer. Where the material values are important, therefore, the purchasing should be conducted with great care. Responsibility for all purchases should be centralized, for, where buying is entrusted to several people, loose and extravagant methods are sure to result.

39. *Material requisitions.*—The material purchased for most enterprises is, as before noted, of two kinds, namely, material which is to go directly into product, or direct material, and supplies such as coal, oil, waste and the like, that do not go directly into product, yet are chargeable against production. The relative value

of these two classes of material will depend on the industry. In some general manufacturing industries the indirect material may be a small part of the purchases and the authority for requisitioning it may be delegated to the store-keeper, the summarized accounts of the indirect material purchased serving as a check upon the quantities used. In other industries operating on a large scale on cheap material, the indirect material may be a very important item and the authority for issuing requisitions on the purchasing agent may be limited to more responsible officials.

In the case of a shop which does repair work, principally, the material requisitions would most naturally originate with the foreman or superintendent, since, in general, he alone will know what is needed. Where the factory is building new work involving the making of drawings and engineering requisitions, the material requisition would most naturally originate in the engineering department. In many other cases the order department originates the requisitions, basing them on the drawings and specifications, or similar information. Requisitions made out in the engineering department are, however, likely to be more accurate than those made in another department less familiar with the constructive features of the work.

Again, in a factory manufacturing standardized articles in continuous operations, the requisitions would emanate from the stores department, since this is the department charged with keeping the factory supplied with material. All requisitions for indirect material or supplies would also naturally originate in this department.

There are many shops where all of the three classes of work just outlined are carried on. In such cases, requisitioning

tions for the purchase of materials might properly originate from several sources. It is necessary, however, even here to see that this authority is centralized and that only reliable and intelligent officials are given authority to make out requisitions for the purchase of goods of any kind. Furthermore, no matter where the requisition may originate, it should pass through the hands of the store-keeper so that he may use whatever material he may have on hand or use up other material that may be substituted. Dead stores are, perhaps, the most unproductive form of capital investment, yet a casual examination of almost any large store-room will show an amazing amount of this sort of material, much of which could be used up if proper care were exercised.

The particular form of the material requisition is not important, but whether issued by the foreman, or by the order department, it should, of course, bear all the information needed to identify the material with the work or purpose for which it is intended. If the order is for a certain job the requisition should give the job number, the time when the material will be needed and all other particulars regarding the physical and chemical characteristics which it must possess. In large enterprises the material requisitions are made in multiple, one copy being retained by the official issuing it, one going to the store-keeper and one going directly to the purchasing agent. Other copies may be sent to other officials, depending on the exact system in use.

40. *Purchase orders.*—The purchasing agent bases the purchase order on which the goods are bought upon the material requisition. A typical purchase order is shown in Figure 6. This order, besides giving the necessary information regarding the material needed, will

**BROWN MFG. CO.
BOSTON
PURCHASE ORDER**

TO.....
ADDRESS.....

PLEASE SHIP THE MATERIAL DESCRIBED BELOW
PLACE OUR PURCHASE ORDER NO. ON ALL INVOICES
SEND DUPLICATE INVOICES AND BILL OF LADING

PURCHASE ORDER NO.....
PRODUCTION ORDER NO.....
REQUISITION NO.....
DATE.....

SHIP ON OR BEFORE	DESCRIPTION	QUANTITY	PRICE
BROWN MFG. CO. PER.....			

FIGURE 6

PURCHASE ANALYSIS							
DATE	PURCHASE ORDER NO.	PURCHASED FROM	DESCRIPTION	MEMO OF PAYMENT		STORE ROOM DR.	
				DATE	CHECK NO.	MATERIALS	SUPPLIES
		1					
		2					
		3					
		10	TOTALS				

LEFT HAND PAGE

PURCHASE ANALYSIS									
WORK IN PROCESS. DR.			COMMERCIAL COSTE. DR.			OTHER ACCOUNTS. DR.			ITEMS IN SUSPENSE
ACCOUNT	MATERIAL	EXPENSE	ACCOUNT	MATERIAL	EXPENSE	ACCOUNT	MATERIAL	EXPENSE	

RIGHT HAND PAGE

FIGURE 7

bear the requisition number and, if necessary, the production order number of the job for which it is intended and will, in addition, be given a serial purchase-order number as indicated in Figure 6. The purchase order will also bear a request to the merchant furnishing the material, to place the purchase-order number upon the invoice of the goods so that they may be identified, upon arrival, with the purpose for which they are intended. The purchase order will also bear full shipping instructions and sometimes a return receipt is attached which the merchant from whom the goods are purchased may tear off, fill out, and mail as an acceptance of the order. A copy of the purchase order is sent to the receiving department so that the goods may be identified on arrival.

41. *Receiving material.*—The material is now identified with its purpose and when it arrives at the factory it is carefully checked as to quality, quantity, etc., and a receiving memorandum vouching for these facts is made out by the receiving clerk and checked by such other officials as may be deemed necessary. Sometimes a copy of the purchase order itself is used for checking up invoices. This practice, however, is not to be recommended, experience showing that greater accuracy is obtained where the invoice is checked up independently and then compared with the purchase order. In either case the receiving clerk also places upon the memorandum the purchase-order number and the production or shop-order number if the material has been ordered for a particular job, or the stores-order number if it has been ordered for general stores. He may also fill in any freight, cartage or other transportation charges and state whether they have been paid or not. Copies of the receiving memorandum are sent to the store-keeper, the purchasing agent, the accountant or others interested in the trans-

action, depending on the system in use. The material being thus identified is taken to stores or directly to the production department, depending on the circumstances.

42. *Purchase analysis*.—In some enterprises the purchased materials are not only of great variety, but they are used for many purposes, part of them going into stores first, part going directly to the factory and another part passing to some outside construction or direct to a customer. Furthermore, the number of invoices may be so great as to become burdensome if carried directly to the general books. In small factories the invoices themselves may be filed and indexed and the items posted directly from this file to the cost ledger or the general books as may be desired. But in large and complex enterprises it is better to enter the details of invoices in a purchase-analysis book or purchase record as it is sometimes called. A typical form for the page of such a book as might be used in a machine manufacturing establishment is shown in Figure 7. Each page may be devoted to the record of one kind of material. It will, in general, record the purchase-order number and perhaps the invoice number. It will record the date of the order, the name of the dealer and such descriptive detail as may seem necessary. In addition it will be provided with columns for recording the distribution of the material. Thus, in Figure 7 provision is made for keeping a record of all material going to the store-room, to work in process, to commercial costs directly, to suspense accounts and also provision for debiting unclassified accounts. A space is also left for recording any payments that may be made on any invoice that is recorded. The detail in which this analysis is made will obviously vary with the business, but it is clear that such a record con-

duces to a clear understanding of just how all incoming material should be charged and distributed to costs.

43. *Store-room methods.*—A good cost system is impossible without a good store-room and good store-room methods. Such a store-room will have a place for everything and everything in its place. All stores will be guarded against theft or unauthorized use with as much care as the cashier guards his cash. The writer is well aware that such detail is often considered a waste of time and money, and while it is true that there are isolated cases where the supplies are so few or so cheap that it will hardly pay to keep a store-keeper, it is also true that such cases are very rare. It is a rare instance where a stores system will not pay good dividends.

The exact method of storing materials will, of course, vary with the industry and the class of material, but in any case all material should be stored in a convenient and accessible manner so that it is possible to draw it without interference and also possible to take account of it with ease and dispatch. In the best systems each lot of material, or rather each bin or other receptacle, is numbered or otherwise designated so that material may be listed and found or referred to by list. Where the works are large and several branch store-rooms are in use this system must be comprehensive. Thus the designation 6 A 24 h might mean that certain material was stored in building No. 6, division A, section 24 and bin or rack h.

All material ordered for an industrial enterprise may be classified as either standard material or special material or supplies. Standard material includes such material as is used constantly in the product. In continuous industries this will be fairly constant in character, but the demand will vary with the activity of the enterprise.

Provision must therefore be made by the store-room for anticipating the demands of the factory. The store-room bins and racks in such cases may be likened to reservoirs for equalizing the supply and demand. The amount in each bin or rack should therefore never fall below a certain minimum limit nor exceed a certain maximum limit, these limits being fixed by the conditions of manufacturing.

The simplest method of insuring that a proper amount of each kind of material is on hand, when limits have been set, is by the method of observation of limits. A printed form is attached to each bin or rack and on this form the limits are recorded. As material is drawn the store-keeper deducts the amount so drawn, thus keeping a continuous record of stock on hand. When the lower limit is reached a requisition is placed for enough new material to bring the contents up to the maximum. By this means the wants of the factory are anticipated and at the same time capital is not unduly tied up in idle material.

44. *Stores-ledger or continuous inventory.*—In more highly developed forms of material-recording systems all records are kept by the head store-keeper, or his clerk, either on a card system or a loose-leaf ledger. Such a ledger has columns ruled to suit the special needs of the stores department and is commonly called a stock-ledger. The term stock, as before noted, refers more properly to finished product. The name stores-ledger is more accurate when referring to raw material and will be used in this work, though it does not conform to common usage. A typical page from such a ledger is shown in Figure 8. The record of only one item is carried on each page and this record, it will be noted, includes not only all receipts and issues of the material

recorded, but also all orders for new material and a record of any material on hand that has been assigned to work in process of manufacture. When a requisition from the production department is filled from the stores it is cancelled and sent to the head store-keeper and no record is necessary at the bin or rack. These cancelled requisitions in connection with the verified invoices of new goods give the store-keeper complete information regarding the condition of the material for which he is responsible and if his department is properly conducted the stores-ledger is a continuous inventory¹ of all material on hand in the stores. Provision is usually made on the stores-ledger sheets, as in Figure 8, for noting the price per pound or piece and the total valuation, both for the purpose of inventory and for the purpose of correctly fixing the value of all goods issued from the stores.

The functions of a stores-ledger are, however, somewhat broader than simply serving as a means of keeping track of material. If properly kept it enables the manufacturer to carry the minimum amount of material and hence keep down his investment to the lowest economical point. A well kept stores-ledger greatly facilitates the care of the material and is a great check on wastes and losses due to carelessness either in workmanship or in handling of materials. Where the material handled is varied and valuable there is the same need of a stores-ledger as there is for a cash book, though, curiously enough, it is difficult to convince many hard-headed managers that this is a fact.

45. *Visual or "physical" inventories.*—It is still customary with many managers to take an inventory but once a year. Modern accounting methods demand, how-

¹ Sometimes known as "perpetual inventory."

ever, that close track be kept of all changes in the value of the plant and material. It is quite easy to keep a fairly accurate record of all changes in the plant and equipment, but without good stores-ledger accounts not even an approximation can be made as to changes in material values. With a good stores-ledger and a cost ledger which records the changes of material in process, and which will be discussed later, a complete continuous inventory can be maintained and the items in Figure 3, which depend on material values, can be found at any time. It is a good policy, of course, to make an actual visual or "physical" inventory of the entire plant, occasionally, to verify these running inventories. A good store-keeper will constantly check up material on hand to see that no wastes are occurring either from theft, carelessness or error and to make sure that his stores-ledger is a true inventory of the goods for which he is responsible.

46. *Handling indirect and special material.*—Indirect materials or supplies are treated so far as stores are concerned, in the same way as direct material. If the plant is large they may be kept in a separate store-room, but this is rather exceptional. The method of withdrawing such material for use and the method of charging up its cost is, of course, very different from the procedure in the case of direct material and is more fully discussed in Section 54.

Special material is that ordered for some particular piece of work and not ordinarily used in the manufacture of other products. It should, therefore, be ordered with care, only enough being obtained to satisfy the particular need, as it may depreciate in value very rapidly in the store-room. Sometimes special material is not put into the store-room, but is sent direct to the place

in the factory where it is needed, its value being charged to the proper account in the general books, or sent to the cost ledger, depending on the system in use. If, however, the time of arrival of special material does not coincide closely with the time at which it is needed it should be stored in regular manner. It is bad policy to have material which is not specifically wanted lying around the factory.

47. *Finished parts.*—In continuous process industries of the extreme type where the raw material is largely of the direct kind and flows through the factory without pause, the functions of the store-room may be confined largely to the care of supplies. But as the industry approaches more and more closely to the strictly intermittent type it becomes increasingly necessary to arrest production of many parts at various stages of completion and store them in a partly finished state until needed. Thus in making a line of engines it may be sufficient for the needs of the business to make the flywheels singly as needed; but it may be economy to cast and partly machine the engine beds in small lots, and again it may be desirable, both because of economy in manufacture, and also because of the possibility of quicker delivery of finished engines, to make up the small parts of the valve gear in fairly large lots. The financial and manufacturing economy underlying this practice is interesting and instructive, but is beyond the scope of this work. It will be assumed that the practice is correct.

If the business is a very large one, as before stated, a separate store-room known as a finished-parts store-room may be maintained, but, usually, the one store-room cares for both raw material and finished parts. Sometimes a distinction is made between finished parts that are made in the shop and purchased finished parts.

This distinction, however, is of no importance provided the cost of each part is accurately known. So far as the production department is concerned finished parts do not differ from other products and they should bear their full share of all indirect expense. This should be kept in mind in evaluating such parts, since factory expense is an integral part of shop cost.

In issuing such finished parts to customers, for repairs, they would, of course, be charged with their proper share of general expense and with an allowance for profit the same as any finished product. In issuing them to the production department to be used in assembling complete machines they would be treated like any other material, or finished parts that have been bought elsewhere. Care must be exercised, however, that expense charges are not duplicated. Thus if the material value is used as a basis of distributing the expense it would not be logical to charge the expense on this basis when putting the finished parts into the store-room and then duplicate this procedure when the parts are assembled into finished machines. The best method of distributing the expense on finished parts will be clearer after a discussion of the methods by which this is accomplished. This matter is treated fully in Chapter IX.

CHAPTER V

ISSUING AND EVALUATING MATERIAL

48. *Issuing materials.*—It is a cardinal principle in good cost-finding systems that no material of any kind is issued from the stores without a requisition which indicates the authority for the transaction and the account to which the material is to be charged. It is true, of course, that in small shops, and particularly where the material handled is of no value for personal use, it will not pay to employ a store-keeper; workmen may be allowed to help themselves from open bins or racks. As before noted, these cases are rare; in general, it pays to have a store-keeper whether detail costs are kept or not. He will, as a rule, save more than enough to pay his wages. It is universal experience that workmen when allowed to draw either direct or indirect material from the stores, without check, become careless and wasteful, not only as to the quantity drawn out, but also as regards its economical use. Loose store-room methods are also likely to lead to dishonesty, pilfering and bad habits generally.

49. *Requisitions by foremen.*—The simplest way of drawing material on requisition is to empower the foreman to issue the required requisition. The foreman is provided with an order book and no material is issued except on an order from this book describing the material, its amount, and the purpose for which it is intended. This system is simple and flexible. It responds quickly to any emergency and for this reason is particularly ap-

plicable to small shops. There is no delay in getting material from the stores to the production floor, and in a shop doing repair work this is a valuable feature. In many small shops, where the work is more or less uncertain in character, where the number of men employed is small, and refined cost-finding methods are not necessary, this simple system will answer all requirements. It certainly is a vast improvement over the loose methods so often seen in small shops.

If, however, the enterprise is large and each foreman has many men under him, it is not good policy to fill up his valuable time with clerical duties. He has, usually, too many other important functions to perform¹ and if pressed for time, as he usually is, he will not do this requisitioning well. He can, of course, be given a clerk to help him in this work and this may answer for certain kinds of moderate sized plants. From the standpoint of intelligent cost-finding, however, even this is a palliative and the method fails for other reasons that will follow.

50. *Planning in advance.*—Brief mention was made in Section 10 of the growing tendency to separate all planning functions from those that have to do with production. This is well illustrated in the engineering department where all structural plans are made entirely aside and in advance of actual production. A similar movement is making rapid progress in the production department proper, looking to the planning of all productive processes in advance of the actual productive operations. The general philosophy that underlies these movements holds true also for cost-finding.

If intelligent costs are to be found they must be

¹The student will do well to read Mr. F. W. Taylor's paper on "Shop Management," particularly that part dealing with the many duties of the average foreman, in the Transactions of the American Society of Mechanical Engineers, Vol. 24.

planned in advance. Just as the designing engineer should plan in advance all the constructive features of the product, and as the superintendent of production should preplan his productive processes, so the cost-keeper should know in advance what costs he needs to collect and lay his plans to collect them without at the same time gathering a mass of information he does not want. One of the most common and most drastic criticisms that is applied to many cost-finding systems is that they waste money in finding detail costs that are not useful, while neglecting, perhaps, cost data that are extremely valuable. It is for this reason, as before noted, that a good cost system cannot be installed in the abstract. It must take into account the characteristics of the business itself.

In a well-organized modern factory of the intermittent type, therefore, the engineering department will turn over to the production department drawings and specifications which show just what is to be done. Each piece called for will bear an identifying number or symbol as explained in Sections 31-34. In best practice the engineering department will also furnish complete bills of material showing in detail just what direct material is needed for each part. Where this is not done by the engineering department, bills of material are made out by the order clerk (Figure 2). Obviously, the more accurately these material lists are compiled, the more accurately can the raw material be drawn from the store-room.

51. *Production orders.*—The order clerk now issues a production order, as illustrated in Figure 9, to the foreman under whom the work is to be done. If the amount of material to be drawn is comparatively small this production order may be also, for convenience, the

material list, as illustrated by Figure 9. This is not an essential feature, however, as the material list may be on a separate sheet or may be a permanent record on the drawing itself. The production order will, in general, give all necessary information regarding time of completion, disposition of the part when finished and will bear the specification or drawing number of the part referred to and also the production order number to which the cost of the production is to be charged, thus identifying the part with the time cards that are to be returned from the factory, recording the details of its production.

Obviously, the issuing of production orders requires not only an intelligent understanding of the costs that are desired, but also of the manufacturing problems concerned. A single production order might be made to cover a battleship or an order might be issued for every individual part going into this same ship. It requires a high-grade man to place production orders so as to get all the results desired and yet not waste money on details that are not necessary.

52. *Instructions to store-keeper.*—The production order and material list are usually made in multiple, one copy going to the foreman concerned, with all drawings and specifications connected with the work, and constituting his permanent authority for doing the work. Another copy goes to the store-keeper and is his authority for issuing the material when demanded by the foreman. A copy is, of course, retained by the order clerk. The store-keeper or his assistant issues the material called for, cancels his copy and corrects his record of material on hand, either at the bin or on the stores ledger if one is kept. If a stores ledger is kept the record of the transaction may be recorded under "issues" as indicated on Figure 8. The production order can then be evalu-

ated, the price per pound or piece being filled in, and forwarded to the cost department to be incorporated into the cost of the part to which the particular production number belongs. Obviously, a similar procedure could be followed with the simpler form of requisition issued by the foreman, but the accuracy of the material list as made by a busy foreman is greatly to be doubted.

Theoretically, this method is very accurate. In prac-

TO DEPT.....		PRODUCTION ORDER		ORDER NO.....	
DATE OF ISSUE.....				DRAWING NO.....	
TO BE COMPLETED BY.....				PATTERN NO.....	
DELIVER TO DEPT.....				SPECIFICATION NO.....	
				CLASS NO.....	
PLEASE EXECUTE THE FOLLOWING ORDER RETURNING THIS SLIP TO STOREKEEPER ON COMPLETION OF WORK CHARGE ALL LABOR AND MATERIAL TO THE ABOVE PRODUCTION ORDER NO.					
DESCRIPTION OF ORDER					
QUANTITY AND DESCRIPTION OF MATERIAL TO BE USED				DATE NEEDED	DEPT.
DATE ORDER COMPLETED.....				APPROVED.....	

FIGURE 9

tice, however, it is difficult to specify with absolute exactness every item of direct material needed; but, except in the case of very complex work, the errors need not be serious. This defect is more than compensated for by the manner in which the method prevents unnecessary withdrawal of direct material and fixes the proper authority and responsibility for withdrawal in such a manner that errors and irregularities can be instantly traced to those responsible.

53. *Emergency requisitions.*—A great objection often

made to such a system is that it is not flexible under emergencies, and small jobs always cost more when passed through such a system than they would in a shop operating under a simpler system. This defect can be partly obviated, however, by empowering some official to issue emergency requisitions to take care of these special cases. If an emergency repair job should appear there would be no time to make drawings and material lists or even perhaps to issue production orders. In such a case the official possessing this emergency authority would issue such material requisitions as are needed and have them approved and proper production orders assigned as soon as possible thereafter. Provision must always be made in any system for caring for emergencies or its inflexibility may destroy its usefulness. Many good cost and other systems have failed for this reason. Some, in fact, have failed to obtain even a good foothold in shops where they were being introduced, largely because impatient foremen or superintendents, who are being hard pressed for production, fear that the new system will destroy flexibility, though perhaps improving other manufacturing conditions.

The foregoing discussion has reference largely to manufacturing enterprises of the intermittent type, though the principles are general and apply to many other forms of industry. As the enterprise approaches more closely to the other extreme, or continuous operation, the necessity of detail becomes less and less, until finally no production order for direct material may be needed, as all material will be purchased in large quantities and its value carried directly to the general books.

54. *Requisitioning indirect material.*—Indirect material, such as coal, waste, oil, brooms and the like, is not handled by production order. Usually this class of ma-

terial is drawn on the foreman's requisition. It is still customary in many factories to have the foreman assign the order number to which the supplies drawn are to be charged, this number being, in general, the production order number on which the workman is at the time employed. As will be explained later (see Section 94), such supplies should be charged to standing order numbers, if intelligent costs are to be obtained, and distributed by one of the methods to be discussed. The store-keeper evaluates the foreman's requisition for indirect material and sends it to the cost department. It should be noted in passing that where supplies are drawn in very small quantities it is difficult in some cases to keep an exact record.

55. *Valuation of issued material.*—The value of material stored in the bins of the store-room is necessarily somewhat greater than the market value of similar material. Freight, cartage, handling of the material in storing it, rent or interest on the building investment, insurance, wages of store-keepers, waste, shrinkage in use as by saw cuts and remnants, defective pieces, repairs and other store-room expenses, are all necessary expenditures which must be paid in order to obtain the advantages of having material ready for immediate use. This expense should never be overlooked in evaluating the material issued from the stores. The importance of this is evident if material should be shipped direct to a customer from the store-room as is done in mercantile establishments. Obviously, unless the billing price of such goods is an advance on the market price paid for them, a loss will be incurred. In fact it is sometimes more profitable for a factory to order standard material to be sent direct from a dealer to one of its customers than it would be to fill the order from the store-room bins.

Furthermore, material is crystallized capital which is earning no interest. It is perfectly proper, therefore, to charge against it the interest it should earn and this again adds to its value. Materials also may depreciate in value while stored and while this loss in value is a proper charge against production it is usually more convenient to handle it in a separate manner from those now to be discussed.

In the simpler and merely approximate methods of cost finding, all store-room expenses are carried to the factory expense account and charged off as part of this expense. While this insures that the total of such expense is cared for, it does not distribute it logically, and more modern methods of cost finding distribute store-room expense as a percentage on the value of the material issued. This, as will be seen later, is in accord with modern tendencies which aim to allocate all expenses, as far as possible, to the particular activity to which they peculiarly belong. The value of issued material should, therefore, be determined by adding freight and cartage to the invoice price of the goods and then adding a percentage to cover store-room expenses.

Now the invoice price of goods of the same character changes constantly with the changing market price. The material in a given bin may have cost more or less than a new lot which has just been added. To equalize this difference in prices, the total value of the entire lot may be divided by the total combined number of pieces or pounds and a new average rate determined which will equalize the market fluctuations.

56. *Material in process of fabrication.*—It will be noted that the foregoing store-room methods do not take cognizance of materials that are in process of fabrication. Modern accounting methods, however, often

require regular and frequent statements of the financial conditions of the enterprise. If the enterprise is of the continuous type where the value of the material in process, at any time, is not great, the methods described above may be adequate for all purposes. In many cases, however, the value of the material in process is very great and no correct statement of the business can be rendered without taking it into account.

It is obvious that it would be well nigh impossible to keep account of the material in process by simply adding to it the value of the material drawn from stores and subtracting from it the value of the material delivered to the stores or the shipping room. For this reason, even in factories where some lines of product are in continuous production, it is customary to pass the product through the factory in lots, a production order being issued for each lot. If a cost ledger is kept an account would be opened for each lot under its own production number and all material which goes into the lot naturally finds its way to this account and can be evaluated at any time. The total value of all material appearing in the cost ledger is the value of all material in process.

57. *Stock tracing*.—Where the products of the factory are varied and where many finished parts are made for the stores it is often very important to know the state of fabrication of all production orders. Thus if the supply of a certain kind of finished parts were low, it would not be good manufacturing policy to place a rush order for a large number of these parts, if a large number were just nearing completion and were about to be delivered to the stores by the production department. To obviate this difficulty a stock-tracing ledger is sometimes employed. This ledger is usually of the

loose-leaf type or a card system; a single leaf or card is used to record the movements of one lot of material from the time it leaves the store-room until it is delivered as finished parts. It is in reality a continuous progress report of the particular lot of material, the movements of which it records, as it passes through the factory. In simple systems these ledger sheets may also record the cost of the material as well as the accruing labor on it, thus combining the functions of a cost ledger with those of a stock-tracing ledger. In general, however, it will undoubtedly be better to keep these two functions separated, using a cost ledger for financial summaries of costs.

58. *Stock dispatching*.—Under advanced methods of factory administration the preplanning of productive processes and the scheduling of all movements of material and times of operations are becoming an important feature. Even a brief discussion of these stock-dispatching methods is beyond the scope of this treatise, but the accountant who is installing a cost-keeping system will do well to inform himself regarding these modern methods, since they are so closely related to cost-finding methods. Aside from any direct assistance which they may render in finding costs, their indirect effects, either to reduce or increase costs, should be studied carefully. The introduction of such methods and systems may be justifiable even though they do not reduce prime cost. Thus if they succeed in increasing the rate of production without change in the prime cost of production an increase in profits is made possible. Again, if the time of delivery of product can be hastened and made more certain a gain may be accomplished for which the factory can afford to pay something; but none of these results should be taken for granted and each and every item

of this kind should be judged with the financial facts in hand and not on superficial evidence or personal opinion.

59. *Finished product and stock.*—When product is made to order it is usually shipped to the customer when completed, the factory cost is summarized from the cost ledger or corresponding record, the necessary additions for general expense, selling expense, and profit are added and the transaction is closed except for the collection of payment. Where the product is made in anticipation of the market, and especially where production necessarily is in large lots the finished product must be held in storage till sold. A large factory may have not only a large stock of finished goods in the central stock-room at the factory, but branch offices may also carry such finished product and the amount of money so tied up may be very great.

The general and selling expenses are usually distributed over the product as a percentage on the factory cost. It is no longer necessary, therefore, to keep the labor and material components of cost separated and finished product may therefore be listed on the stock records at factory cost. The methods of distributing general and selling expenses will be discussed in a later paragraph.

60. *Finished stock record.*—Just as it is necessary to have accurate records of raw materials and finished parts, so it is necessary to have accurate records of all stock. Such records are not only a guide in placing production orders, but if properly studied they will prevent the accumulation of obsolete stock. Records of this kind are usually kept on loose-leaf ledgers such as is illustrated in Figure 10. A leaf is devoted to each item of stock and shows all receipts from the factory, all ship-

be obtained at any time the value of all material grouped in the three important stages of fabrication, namely, as raw material, material in process and finished product.

61. *Material wastes*.—A most important feature of the care and accounting of materials is the matter of waste. Every factory has its own peculiar sources of waste and these should be carefully located and their effect minimized as far as is possible. Wastes are of two general kinds and may be classified as avoidable and unavoidable wastes. Those due to carelessness in handling or over-issuing material are what may be called avoidable wastes, as are also losses by pilfering or diversion of material from the factory in any way without compensation. A well-kept stores ledger and a careful periodical checking up of material on hand will minimize losses of this kind. If more material is issued than is actually needed for the work in hand serious loss is sure to occur. Material left over from productive work is not likely to be returned to stores unless a special effort is made to do so. Ordinarily it will lie around the shop in boxes, and under benches, and much of it will find its way into irrecoverable scrap. Material requisitions should, therefore, be drawn with care to minimize this form of loss and any material left over from a given job should be carefully returned to stores and credited to the work for which it was originally requisitioned.

Unavoidable wastes are those such as are incurred in cutting up material. Thus the waste due to cutting up copper bars, either by saw cuts or under presses, may be considerable. Even with cheaper material, as, for instance, sheet steel, where large quantities are used, the value of the scrap may be great. If the waste is in such form that it may be returned to stores and used

for other purposes, the job in question may be credited with the value of the scrap incurred in its production. But in any case all scrap and waste should be carefully noted and if salable it should be gathered up and stored, pending such sale. Not the least important feature in the handling of material is to impress on foremen and workmen that material represents money and should be treated accordingly.

62. *Careful ordering.*—Aside from the service which the engineering department, or similar planning departments, can render in making up accurate material requisitions, it can, also, often save large sums by using standard material and material on hand instead of ordering special material. Special material if not used for the purpose for which originally intended is likely to become obsolete and a loss is incurred that might have been saved by careful planning. When, also, an accurate statement has been made of the material required for any job it should be preserved as standard. In some cases the material required is noted on the drawing itself, thus making it a permanent record. This idea is also in line with modern management which tends to standardize operations and times of performance.

It will be clear that the value of all material purchased as recorded in the general ledger account may exceed the value of the same material as charged to production in the cost ledger by the amount of waste and similar losses. In some kinds of manufacturing such differences are difficult to check up; but where possible this should be done periodically. If there are any returns from the sale of scrap this should, of course, be taken into account in considering the difference between the two summaries.

CHAPTER VI

COST OF LABOR

68. *Labor in general.*—It has been shown that the material entering into a given article in most instances can be ascertained in advance. Bills of material can be made out, material can be measured, weighed or counted and the value entering into a given part can be recorded with sufficient accuracy. Labor costs, however, present a somewhat different problem. The amount and value of the material going into a given part will, in general, be fairly constant, but the labor value may vary within wide limits if means are not taken to prevent such variation. Labor is usually the largest item entering into factory costs and since, also, the direct labor is often used as a means of measuring the factory expense which belongs to each part, it is obvious that labor costs should be accurately determined if possible.

In industries employing large and expensive machinery labor costs are doubly important. So far as actual wages are concerned it might make little difference whether a workman was paid \$3 or \$4 a day; but if the difference in wages is a measure of relative efficiency and if this difference is reflected many-fold in the product of a large and costly machine the difference in output might be very marked. To the manufacturer pressed by competition, there are, apparently, only two ways of reducing his costs. One is by reducing wages, the other is by developing better methods. But low wages do not necessarily mean low costs, since labor is not as yet such a closely definable quantity as is material.

It is, therefore, highly important that careful records be kept which will enable the manager to tell as closely as possible the labor costs of all operations performed. Even where accurate labor costs are not obtainable it is good policy to take a record of all time expended if for no other reason than to continually impress the workman with the value of time. There is seldom much difficulty in obtaining and recording the time bestowed upon any given part, but to find out whether this recorded time is a just amount is not an easy matter. A brief examination of prevailing pay systems makes this point clearer.

64. *Two methods of rewarding labor.*—There are two and only two primary methods of paying for work. One is by paying the workman for the amount of time which he spends on the work, at an agreed rate per unit of time, and the other is by paying for the amount of work which he performs at an agreed rate per piece. The first method is called day-work, because formerly the most usual time unit paid for was one day. The other is known as piece-work, since payment is made by the piece. All other schemes for compensating labor are combinations, of some kind, of these two primary methods. It is not within the province of this book to discuss the relative merits of different methods of rewarding labor, but enough must be inserted to show some of the problems involved that interest the cost keeper—first, because this will indicate the problems met in actually recording labor, and, second, because this will also indicate certain tendencies in modern methods which will undoubtedly have a marked effect on cost finding and cost-finding methods.

65. *Day-work.*—The day-work method of rewarding labor is the oldest method and the reason for its original

use is not difficult to discover. In the beginning of any industry the duties of the laborer are general and not special. In former days and under simpler methods where the attitude of the employer was essentially paternal the day-work system was the most convenient and most natural one. The relation of the employer and employé was quite personal and the employer depended on the loyalty of his workman to render value received. Where the number of men is small and the work will permit of close personal supervision this system is still effective. It is even now in general use and will no doubt continue in use even where other systems would be better, simply through inertia. In large organizations the higher officials are still paid on this system, though other methods may have been adopted in the factory. Where close supervision is not possible, as in outside erection work, day pay is usually the only workable method, but care must be exercised in selecting reliable men for such work.

The unit of time for which pay is rendered varies with the grade of the employé; the higher the grade the longer, as a rule, is this unit. Thus managers, treasurers and other higher officials are usually hired by the year or for a term of years and are paid by the month. Foremen, engineers and the like are hired and paid by the month. Other classes of labor are usually paid by the hour, no fraction less than one-half hour usually being considered. The philosophy of the system is well illustrated in the foregoing classification. It cannot be depended upon to insure value received unless the employé is loyal and free to put forth his best efforts. Obviously, the only factors needed in recording labor costs under this system are the hours worked and the rate agreed upon.

66. *Piece-work*.—As factories became larger and the personal relations began to vanish the defects of the day-work method became more and more apparent, especially when complicated with the growing influence of labor organizations. Workmen feeling intuitively that they could influence the law of supply and demand by limiting production did not work up to their capacity. The standard of output tended constantly to mediocrity, the old conditions under which men could be driven to greater output having already passed away. The employer, furthermore, did not, and for that matter does not as yet, really know what constitutes a fair day's work and in his dilemma naturally looked around for some other method of insuring returns. Thus the piece-rate method came into prominence.

This system, while not new, has not been much used until comparatively recent times. Under this method the employer pays for the work by the piece regardless of the time expended. If the employé makes more pieces his total wage rises in proportion. If he makes fewer, his wages decrease in like proportion. If the piece rate is a fair one to both parties, this method would seem to be ideal for all concerned, provided the work is of such a character that piece rates can be set intelligently.

67. *Disadvantages of piece-work*.—The difficulty with piece-work arose, however, from lack of knowledge of just what a fair piece rate should be. No systematic study had been made of this matter and when men were transferred from day-work to piece-work, they easily made very large earnings. This in turn tempted the employer, either from cupidity or because he really believed the employé was getting more than a fair share of returns, to reduce the rate, this cut in rate being re-

peated perhaps several times until the discouraged worker found himself working much harder than formerly at a small advance in income. Piece-work has, as a consequence, come into bad repute in most places.

In recording piece-work costs it would seem that all that is needed is the number of pieces made and the rate per piece. But even when the actual time consumed is not a factor in the costs it is an essential requirement in factory management that all men work regularly and turn out a sufficient quantity per day. Profits depend not only on the gain per piece, but also on the number of pieces made. Provision must therefore be made for checking up the regularity with which piece-workers come and go in the factory.

68. *Halsey premium plan.*—It was to be expected that the growth of manufacturing methods would bring with it other plans of rewarding labor if for no other reason than the disappearance of personal relations in large enterprises. The large operator of to-day is very unlikely to consider labor as a personal matter between the worker and himself; but views labor as an abstract quantity to be purchased like any other commodity. Men speak of buying labor instead of hiring men. Yet labor is essentially personal and difficult to measure abstractly, like material, because of the personal relations involved. It is no wonder, therefore, that under modern complex manufacturing conditions, with minute division of labor and the complex social and labor organizations resulting therefrom, these older systems of rewarding labor have been found inadequate. They are still in general use and will continue in use wherever conditions are such as to render them satisfactory; but beyond doubt other methods are rapidly coming into use, particularly in more complex situations.

The first of these new methods was that evolved by Mr. F. A. Halsey, and hence known as the Halsey Premium Plan. Under this method, the worker is assured a definite day's pay up to a certain production. If he exceeds this production he earns a premium in addition to his regular pay. To illustrate, suppose a certain piece of work requires ten hours normally to complete and the workman's pay is \$3.00 for ten hours. Suppose, further, that it is agreed that the workman shall receive one-third of his hourly wage extra for every hour that he can shorten this standard time. Suppose, further, that he does the work in nine hours. Then his premium will be $\frac{1 \times 30}{3} = 10$ cents and his earnings for the nine hours will be $(9 \times 30) + 10 = \$2.80$, or at the rate of \$3.11 per day. Should he fail to reduce the time, or in fact, should he exceed the ten hours set as a standard he would still receive \$3.00 per day, provided, of course, that he was not so slow as to be undesirable.

The Halsey plan, therefore, recognizes the principle of increased pay for increased effort, which is the basic principle of piece-work, but the proportionate return for increased effort is not so great as under straight piece-work. On the other hand, this is compensated for by protecting the workman against being penalized, should he fail to attain the standard performance. It is clear also that special provision must be made under this system for reporting the times of operations and premiums earned.

69. *Taylor system.*—The standards of performance for the Halsey premium system were based originally on such records of previous performances as were at hand, or, lacking these, upon the personal judgment of

some official. In all the systems discussed so far no effort is made to find out what really constitutes a fair basis for a day's work and all of them depend on enlisting the interest of the workman through increased compensation. In 1895 Mr. F. W. Taylor, in a remarkable paper before the American Society of Mechanical Engineers, pointed out that it was possible by studying the details of any operation to arrive at a minimum time in which each operation could be performed and that on these detail observations it was possible to build up, synthetically, the minimum time required for the job or similar jobs. He pointed out, also, that by surrounding the workman with the best conditions and with expert advisors it was possible for the worker to reach the standards predicted by these experts. To encourage the worker to reach a given standard Mr. Taylor established two piece rates, one a very high rate for those who reached or exceeded the standard and the other a very low rate so as to penalize those who did not attain the standard. Because of this penalizing feature, it has been difficult to operate this pay system, but the theory of studying operations in advance with the object of fixing a fair day's rate has become an accepted principle in factory management. Of course, the cost of clerical help for making so-called time studies is a charge against production that must be compensated for by increased production. Within limits, however, the extra expense can be more than overcome and the profits increased by this method.

70. *Gantt task and bonus plan.*—With a view of combining all the good features of the previous methods, Mr. H. L. Gantt introduced what has become known as the task and bonus plan. Under this plan the workman is assured his day rate as under the Halsey plan. A care-

ful study is made of the work and conditions to determine just what a good performance should be and a definite task is assigned to the workman. If he equals or exceeds this standard record he is given a bonus in the form of an extra time allowance. The plan in effect gives day pay if the task is not performed and piece-work pay if the bonus is earned. Mr. Gantt lays great stress on the training of men to enable them to earn the bonus, thus utilizing labor as he finds it and not excluding the mediocre man who, in the beginning, might not be able to make a bonus, but who may easily do so under proper instruction. The methods of recording labor costs in this system must take cognizance, therefore, of several factors and special provision must be made for getting such records.

71. *Emerson system.*—The system introduced by Harrington Emerson assures the workman of his day's pay as in the Halsey plan. Like Taylor and Gantt, Emerson makes a careful study of the work and establishes a standard performance. A large bonus is offered the workman if he attains this standard performance, but smaller bonuses may be earned before reaching this standard, very much as in the Halsey plan; so that the worker's wages vary with his efforts. No bonus is paid, however, until the worker has raised his output to two-thirds of the standard, or, as Emerson expresses it, when his "efficiency" is 66 $\frac{2}{3}$ per cent.

These new methods of time study and the prediction of manufacturing performances should be carefully noted. Such predictions are, in general, difficult because of the elusive character of the labor element, and recorded costs while presenting accurate records of what has been done are not necessarily a criterion of what can be done. These new pay systems involve more than changes in

the actual methods of rewarding labor. They involve changes in management and if managers are to predict performances, and there is no doubt but that they will, an accurate cost system that will give them the necessary information for so doing will be an absolute necessity.

72. *Methods of recording time and labor.*—No matter what wage system is in use in the factory it is usually desirable to record the time at which every employé enters and leaves the works. In very small plants the foreman is usually depended upon to enforce regularity, but the limitations to this method are obvious. In larger plants each workman is given a number which identifies him also on the detail work cards to be discussed later. In some factories each man on entering takes from a check board a brass check bearing his number and drops it into a box provided for that purpose. In other systems he receives his check on leaving the works and deposits it on entering the works again. The timekeeper notes the absentees by the remaining checks on the board. Late comers are noted by the check-board watchmen as well as those leaving early, the latter being passed out on a special card signed by a foreman. Such a system insures an accurate tally of all men entering and is useful in a very large works regardless of other checks which may be employed.

73. *Time recorders.*—In moderate-sized plants, however, the time recorder is much more serviceable. There are many forms of time recorders, but the general principles involved in their use do not differ materially. Usually each workman is provided with a card similar to Figure 11. On entering the works the workman takes his card, which bears his name and number, inserts it in a slot in the recorder and presses a button or lever which causes the mechanism to record the time at which

this operation is performed as illustrated in Figure 11. On leaving the works the operation is repeated, the clock being adjusted in the meantime to print the time in the "out" column. The card is therefore a complete record

WEEK ENDING <u>MAY 30 1903</u> 190							
No.		154					
NAME		<i>W. H. Harding</i>					
DAY	MORNING		AFTERNOON		EXTRA		
	IN	OUT	IN	OUT	IN	OUT	
MON.	M 6 55	M 12 01	M 12 50	M 6 01			
TUE.	T 6 50	T 12 05	T 12 57	T 6 11			
WED.	W 6 58	W 12 01	W 12 50	W 3 30			- 2 1/2
THU.	T 6 53	T 12 03	T 12 51	T 6 08	T 6 58	T 10 02	+ 3
FRI.	F 7 30	F 12 04					- 5 1/2
SAT.	S 6 57	S 12 08	S 1 01	S 6 00			
SUN.							
TOTAL TIME <u>55</u> HRS.							
RATE <u>32 1/2¢</u> PER HR.							
TOTAL WAGES FOR WEEK, \$ <u>17.88</u>							

FIGURE 11—TIME RECORDER CARD

of the time during which the workman has been in the works, but does not, necessarily, record his true productive time unless used specifically for such a purpose. Such clocks may be placed on the several floors so that, if desired, they may be used also for dating work cards. Where the clock is used simply to check the men in and

out a card of the form illustrated in Figure 11 is usually employed. In some cases two sets of two different colors are employed, one being in use on Monday, Wednesday and Friday, and kept in the office on alternate days for posting. The other set is used on the other days in a similar manner.

Methods such as these provide for the accurate recording of the total time worked, but, in general, do not show anything regarding the character of the work performed or the purpose for which it is intended. In the case of certain classes of clerical and administrative employés working at fixed duties and paid by the month the time-clock record, as noted above, may be sufficient and in such cases the card shown in Figure 11 may also be used as a pay roll as indicated at the bottom of the card; provided, of course, that the clock record is checked up in the manner to be described. But where it is necessary to make accurate distribution of the labor expended, an additional record must be made.

74. *Traveling time-keeper.*—There are two general methods of collecting the detail time of each man. In the first method a traveling time-keeper visits each employé daily, having first checked off the absentees of the day before from the check-board record, if one is in use. From each man he obtains a detail record of his work of the previous day—that is, the number of hours expended on each order number. He records the data so obtained in a book, with a memorandum of the class of work or the machine used, and this serves as the basis of charging up the work to the several orders. Such methods are not to be recommended even in the simple case where every man is on day work. The busy workman is not likely to make a record at the time the work is performed and his memory is unreliable when called on to record the

result of the previous day's performance. When piece work and the more complex premium and bonus systems are used, the traveling time-keeper is inadequate, especially if the number employed is large.

75. *Job tickets.*—The more modern and also more accurate method of obtaining time distribution is by means of the work card, or "job ticket," as it is often called. There are three types of these tickets which may be noted:

(a) The work card which is attached to the material when it is issued from the store-room and accompanies it through the shop, the labor of each man working upon it being recorded as it progresses.

(b) The work card which is issued to the individual workman daily by the foreman and on which he records the details of his day's work, giving the order number of each job worked on and the time expended upon it.

(c) The individual job work card issued by the foreman to the workman for each and every job worked on and on which is recorded the order number and time expended on one job only.

The limitations of the first type are obvious. In small shops and for certain classes of work it is applicable, but the constant handling of such cards, in a machine shop, for instance, leaves them in an unintelligible state in a short time. Furthermore, the accuracy of the information thus recorded is open to question and it cannot be recorded conveniently until the job is finished, thus causing a lag in the cost records. The second form of card is superior to the first since, by it, returns are made daily and can be checked more readily by the foreman as they are turned in. They can also be used to check up the time recorded by the workman on the time clock or check board at the shop entrance. The work of post-

ing up the time charges against the several order numbers is cumbersome, however, if there are many such orders in progress.

The third type of ticket is by far the most flexible

DAY WORKER'S CARD								
MAN'S NO.		DEPT.		DATE		ORDER NO.		
DRAW NO.	PATT. OR PRT. NO.	NO. PIECES	O. T.	HOURS	RATE	VALUE		
DESCRIPTION OF WORK							1	ASSEMBLYING
							2	BALANCING
							3	BANDING
							4	BUILD UP
							5	BURR SEGMENTS
							6	CHIPPING
							7	CLOSING UP
							8	FITTING
							9	HOT PRESS
							10	PRESS ON COM.
							11	PRESS ON COLL.
							12	RIVETING
							13	SOLDERING
							14	TAKING DOWN
							15	PAINTING
16	CONNECTING							
17	INSULATING							
6	7	8	9	10	11	12	1	2
3	4	5	6	7	8	9	10	
APPROVED _____							FOREMAN	

FIGURE 12

PIECE WORKER'S CARD								
MAN'S NO.		DEPT.		DATE		ORDER NO.		
MAN'S NAME								
DRAW NO.	PATT. OR PRT. NO.	OPERATION NO.	HRS.	PIECES	PRICE	VALUE		
					PER			
					PER			
					PER			
					PER			
					PER			
6	7	8	9	10	11	12	1	2
3	4	5	6	7	8	9	10	
APPROVED _____							FOREMAN	

and most commonly used. As before noted, a separate ticket is issued to each man for each job worked on each day and all are collected daily. Figure 12 illustrates such a card arranged for day work. It bears the workman's name and number, the date and order number of the job, and may be arranged as in Figure 12 so that the workman may check off not only the elapsed time expended on the job, but also the character of the operation involved, thus obviating any writing on the part of the workman, which is an important feature in many cases.

Figure 13 shows a similar card arranged for piece workers. In addition to the general information given on the day-worker's card this card records the number of pieces, the rate per piece, and also the elapsed time. This latter has nothing to do with the workman's pay, but is recorded so as to check up the total time against the clock record for reasons already noted.

Figure 14 illustrates a work card which has been used by Mr. Gantt for recording bonus time. It records the time allowed, the time actually taken, the bonus and the total time for which payment is to be made.

These cards, as will be noted, record full information regarding the job. They all record the workman's name and number, the order number, part and drawing number, as well as full information regarding the operation performed. The operation and its cost are therefore identified fully with the order number; and full information is recorded for statistical use if this be desired.

76. *Other time-recording devices.*—Provision is sometimes made for stamping the time of starting and the time of finishing each job by means of a time clock instead of having the workman check them off by hand.

This is illustrated in Figure 14 in the upper left side of the card. The calculagraph, a form of time clock which prints elapsed time, has also been used to facilitate the operation of time recording. There are a number of such devices now in use, among which the compto-

RET'D		JUN 2 6- 00 PM 1913		PART AND ORDER NO. 14783-5	
ISS'D		JUN 2 7- 00 AM 1913		MAN'S NO.	
MAN'S NAME				1 P.M. 23	
Doe, John				FINISHED	
TIME ALLOWED	10.00	TIME TAKEN	10.00	NOT FINISHED	
BONUS	2.50	HOURLY RATE	30	TRANSFERRED	
PAY FOR	12.50	WAGES	3 75	BREAK DOWN	
NAME OF PART OR JOB					
Bolts					
OPERATION NAME	OPER. NO.	MACHINE NO.	NO. PIECES FINISHED	SYMBOL	WAGES
Forming	1	DPM18B	30	PM6B	
ENTERED IN			O.K. FOR QUALITY	O.K. FOR QUANTITY	
DEPT. LAYOUT	A E RECORD	SCHED- ULE			

FIGURE 14—WORK CARD FOR BONUS WORKERS

card and periodograph may be mentioned. These differing methods in no way affect the principles involved, being of the nature of mechanical aids only.

There is one fundamental principle, however, that must be observed. Every piece of direct production should have a distinctive order number assigned to it

and every kind of indirect work should have a permanent or standing order number which remains fixed until changed by the cost-keeper. No work of any kind should be performed that is not authorized by the proper officials and covered by a production order or a standing order number.

77. Summarizing time and labor returns.—All work cards are usually approved by the proper foremen and are then forwarded to the time-keeper, who checks the daily total of each man's card with his clock or check-board record. These should agree of course. If the worker is on day pay this total forms the basis of his daily wage. If, however, he is on piece or premium work, the proper additional data must be added to the pay-roll, though the total time recorded must check as before. The exact method of recording premium and bonus earnings will necessarily vary with the character of the work and the pay system in use, but in any case there should be an exact balance between the pay-roll and the labor values recorded on the cost sheets. As has been shown, it may not always be necessary for all men to hand in a work card, because their duties are simple and constant, and a record of the time expended is sufficient to evaluate their services and distribute their cost. As a general principle, however, it is good policy to have every man whose name is on the weekly pay-roll hand in a work card so that the two systems of recording time will exactly balance.

After the time-keeper has taken the data for the pay-roll, the work cards are forwarded to the cost-keeper, who sorts the cards by order numbers and charges up the costs on each card against the order number which it bears. This work is greatly facilitated by making the work cards of different colors so that they can be sorted visually and

hence rapidly. The charges made to the several order numbers are summarized periodically and carried forward to the general ledger in condensed form. They also form the basis of labor and other reports which will be discussed in a succeeding chapter. Obviously, also, these detail and summarized time charges contain valuable information that can be compiled and compared with profit to the manufacturing superintendent. These methods of recording time are comprehensive and applicable even in very complex manufacturing. It will be clear, also, that as the enterprise considered approaches more closely to the continuous type of manufacturing the methods for collecting the time expended become correspondingly simpler.

78. *Other items of labor costs.*—In the foregoing discussion it has been assumed that there is no lost time between jobs and that the time of finishing one job was the time of beginning another. Such close connection is not always made, however, and if much time intervenes between jobs, care should be taken that such time is not charged against production orders, as is often done and as is advocated by some writers. Obviously such loose time-accounting will vitiate any system of cost accounting; lost time of this nature should be charged to an expense account provided for that purpose. Other items of lost time, such as time paid for without return, as in cases of accident, temporary stoppage of machinery, etc., are similarly handled. A careful record should be kept of these items and they should be analyzed with a view of minimizing such losses.

It might be said in passing that time losses between jobs can be greatly lessened by planning the work in advance, a procedure that is in line with modern ideas of management. A bricklayer cannot lay brick unless

he has them at hand. Even when the workman is on piece work and is the apparent loser through lost time, it should be remembered that the factory loses by any reduction in output, since profits depend on quantity produced as much as they do on profits per piece.

79. *Welfare work.*—The above methods can, in general, be used to account for all labor, both direct and indirect. The direct and indirect labor expended in the actual production of goods may not, however, constitute the entire cost of compensation for the labor employed. In many shops and factories large sums of money are expended to make the surroundings of the workmen more pleasant and comfortable. Such items of expense as may go into providing superior lighting and sanitary equipment can, of course, be justified on the ground that workmen turn out more and better product under such surroundings than they do under the cheerless conditions common a few years ago; and the interest charges on such expenditures may justly be considered as a manufacturing expense.

But there are other branches of so-called welfare work which are concerned with the development of the workman along broad lines of general culture and which are illustrated by provision for general study and social betterment. Even though these efforts may be justifiable, viewing the enterprise as a whole, the distribution of such expenditures should be carefully considered. It would not be wise, for instance, to charge the cost of free mid-day lunches, general reading rooms, summer excursions and the like, to shop expense if the manufacturing superintendent cannot see that such things really do assist production. This is particularly so since many of the most ambitious efforts along these lines have ended in disastrous failure. Where any question arises over the

distribution of such expenditures it may be more expedient to carry them to general expense and hold the general manager and not the factory manager responsible for them.

CHAPTER VII

EXPENSE OR BURDEN

80. *Character of expense.*—Under the general name of “factory expense” or “burden” is included all labor, all material, and all other items of manufacturing cost that cannot be charged directly to some particular piece of production. It will be noted that while, in general, all such material and labor are of the indirect kind, certain expense material may go directly into product. Thus nails, screws, glue and similar items may be used in such small quantities on each piece of product as to make direct accounting difficult if not impossible. Such items are therefore carried to an expense account and distributed with other expense items.

Many items of expense do not naturally attach themselves quantitatively to machines or processes, but gather like clouds, of greater or less density, over the entire enterprise. There is no great difficulty, as has been shown, in finding the cost of the direct labor and direct material that enter into a product. Nor is it a matter of great difficulty to classify the many items entering into the expense and to find the total amount of such classes for any given length of time. The charging off of this total expense over the total product for a given length of time presents, also, a simple problem. But it is exceedingly difficult, except in very simple cases, to assign to each shop order its own share of expense with any great degree of accuracy. The great problem of cost finding is to properly assign the

expense or burden so that each article shall bear its own share and only its own share. This problem may be made a little clearer by a further consideration of the characteristics of expense.

81. *Expense fluctuations.*—An examination of the expense items of any enterprise will show that while some are fairly constant in amount others go up and down with the volume of the business, though according to different laws. In a general way the items that are constant include all expense incident to the existence of the enterprise regardless of productive operations. Thus such items as rent, taxes, insurance, depreciation of buildings and the like, do not vary materially whether the enterprise is active or not; or, if they do change, it is likely to be occasionally and by large amounts. Otherwise, they remain fairly fixed for long periods. Such expense, furthermore, can never become zero, no matter what the volume of business may be. Thus the salaries of permanent officials are of this character and are not affected, in general, by changes in the volume of business.

Other items of expense, on the other hand, are affected quickly by changes in the volume of business. Thus, clerical help, indirect labor and operating supplies are directly affected by such changes, moving up and down as the volume varies—though not, in general, in direct proportion to such variations. Thus it requires a definite minimum amount of oil to lubricate the shafting of a factory whether any machines are in operation or not, and any further oil that may be necessary is obviously dependent upon the volume of work passing through the shop. This relation is usually so complex that it cannot be expressed in terms of any fixed factor of production.

It is important to notice, however, that from this it is clear that profits do not vary with the volume of business. Half volume does not mean half profits, since there is always an irreducible minimum of expense; and if this irreducible minimum is high compared to the variable expenses due to the activities of the business, a comparatively small decrease in business may eliminate all profits if it does not even make a deficit.

82. *Variations due to time.*—Expense again may vary according to time. Thus a large amount of coal may be purchased, either to take advantage of the market, or to provide for emergencies. The use of this coal may, however, extend over weeks or even months. Extensive repairs may be made to buildings or machinery because of the wear and tear incident to the work of previous weeks or months. These and similar expenses may fluctuate greatly and with no reference to the volume of business. Yet, clearly, it would not be fair to current production to charge off such heavy expenses against it, thus unduly favoring future or past production. Such expenses must be averaged over a reasonable period of time even though the method of fixing such an average may be more or less arbitrary.

Expense must often be charged off by an average rate for other reasons. Once a month is about as often as it is convenient or desirable to close the general books and summarize all accounts, direct and indirect. If it were possible to start each job on the first day of the month and finish it on the last day it would be possible to allocate to each job, with fair accuracy, a proper and fair share of the total monthly expense. Such conditions are never found in practice, since all work must be started and finished regardless of the day of the month. Expense must, therefore, be allocated on the basis of

summarized expense costs of the past month or months, the data for the current month not usually being available.

83. *Expense varies with character and size of work.*—The amount of expense which any part should bear will also vary with the character of the operations performed upon it. Thus in a plant manufacturing electrical appliances some parts must be dipped in insulating material and perhaps baked. Other parts will not require such treatment and, clearly, they should not, to be exact, bear any of the expense incident to this insulating department. In factories producing diverse lines and involving both intermittent and continuous manufacturing processes, such conditions are often met and they sometimes offer a difficult problem in cost finding.

The amount of burden that a part is justly entitled to bear may vary also with its size or weight. Strictly speaking, small parts should not bear any part of the expense due to crane service and large equipment in general. Theoretically, at least, a large casting should bear a larger share of the repairs to the cupola than should be charged against a small one. To differentiate such charges is, however, often a difficult matter, but the difficulty can usually be avoided by careful departmentization which will bring parts of like kind and equal size under the same departmental organization.

84. *Clerical expenses.*—These problems and difficulties are common alike to office and shop. It may, and usually does, involve more expense to do the clerical work connected with making a small, complicated machine than it does to make a much larger and costlier product. Clerical work is, in general, difficult of exact allocation, particularly where the product is varied and complex. What is true of the factory office is obviously true of

the general office and sales office, the expenses of these last departments being particularly vague so far as allocation to any one job is concerned.

85. *Two purposes of expense distribution.*—Aside from the above general characteristics of expense, each item of expense has special characteristics that must be considered in connection with its distribution against production. Thus certain expenses, such as fuel, oil and certain kinds of indirect labor, are clearly chargeable against manufacturing expense, while other items are clearly chargeable against general expense or selling expense. In segregating and classifying expense it should be remembered that the object of so doing is two-fold:

(a) To allocate each item as fairly and as accurately as is possible or desirable.

(b) To record and summarize each class of expense in such detail as will make possible its analysis and show content.

The first requirement involves a consideration of methods of distributing expense which will be discussed in a succeeding section, while the second requirement governs the detail in which any item of expense shall be collected and recorded.

86. *Classifying expense factors.*—As noted in Section 21 a clear cut distinction should be made, if possible, between manufacturing expense and general expense. This is necessary, if for no other reason than that of fixing responsibility for such expenditures. The manufacturing superintendent should be held strictly responsible for the expenses that are a legitimate part of production, and for those expenses only. The general manager should assume responsibility for the general expenses which are incurred by the managing and account-

ing branches of the business. In small enterprises the sales expenses are included in the general expense, but usually it is considered better to separate these also, so as to be able to hold the sales manager responsible for his own expenses. In actual distribution of expense, however, it is more convenient to treat sales expenses as part of general expenses as will appear later in the discussion.

It is, of course, not always possible to make an absolute division of expense between these two classes, because the organizations of industrial enterprises differ so widely. Thus the president may also be the sales manager; and the duties of other officials may include supervision of manufacturing and general activities of the business. However, even in such cases a proportional division of their salaries can always be made that will be equitable to all concerned.

In Figure 15 is shown a classified analysis of the cost of production as occurring in an average manufacturing plant. Typical items only are shown since the detail in which it is necessary or desirable to take account of expense depends entirely upon the industry and the size of the enterprise; one very large factory in this country has no less than one hundred and thirty expense accounts. It should be noted that as the size of an enterprise increases, all items of expense assume greater importance and segregation becomes more and more imperative. Each factory expense account is designated by some number or symbol similar to those used for production accounts as explained in Chapter III, and no charge should be made against it unless it is authorized by a written order from the proper official. The classification given in Figure 15 is in general accord

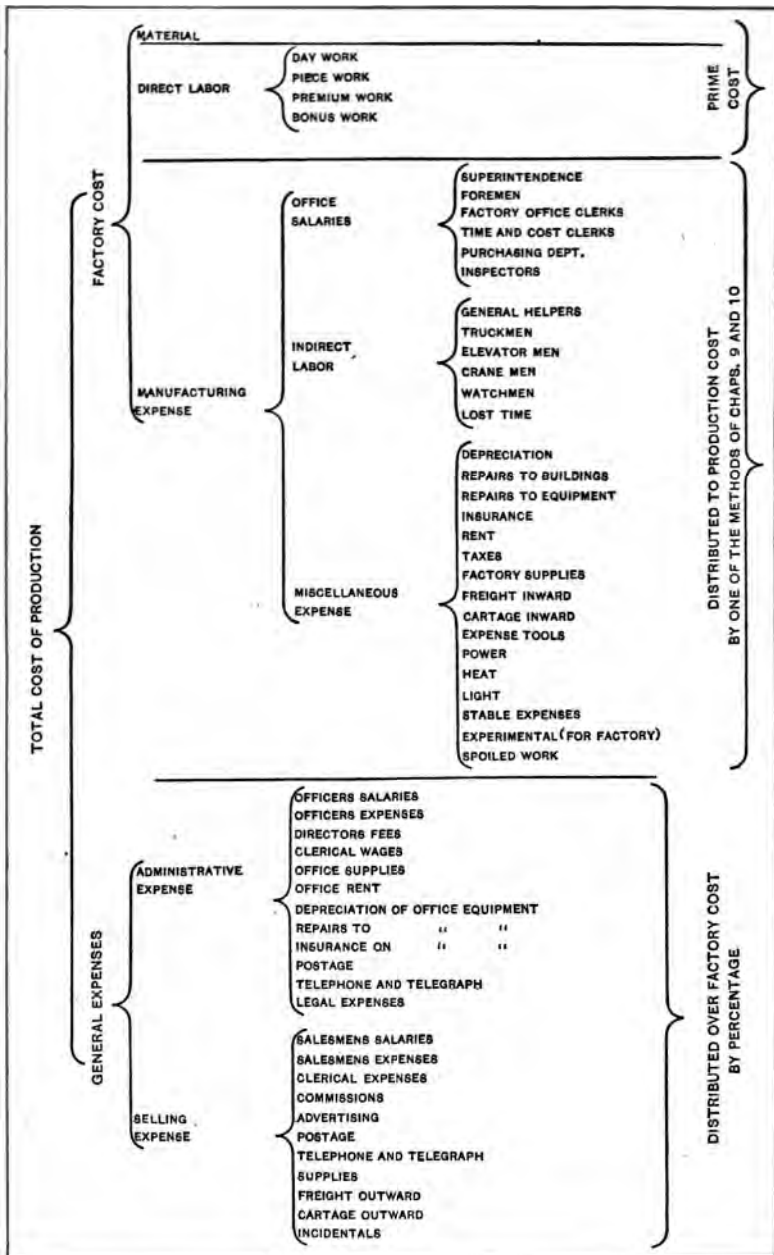


FIGURE 15—DISTRIBUTION OF PRODUCTION AND SELLING COSTS

with the practice of skilled accountants and cost-keepers. The logical distribution of the great majority of these accounts between manufacturing expense, general office expense and selling expense is, usually, not difficult in any particular case; but there are a few items on which all cost-keepers are not agreed and on which more detailed discussion may be helpful. These are interest, rent, taxes, insurance, defective material and spoiled work, lost time, engineering and development, repairs and improvements, patterns, drawings and small tools, and depreciation.

87. *Interest on borrowed capital.*—There is a difference of opinion among accountants and cost-keepers, as to the manner in which these items should be handled. If a manufacturer rents his land or buildings or equipment it is clear that the rent which he must pay is a charge against production. If his product is produced by machinery of varying value, housed in buildings of varied cost, it is obvious that he must distribute this rent upon the basis of rent consumed by each machine or building. The same remarks apply to interest on money which he has borrowed and has invested in the plant.

On the other hand, it is held by some that interest and rent are not connected with production, but are attributes of capital and should be deducted from profits before declaring dividends. While this may be true as an economic theory, it should be remembered that the purpose of cost-finding is not to decide points in economics, but to allocate all expenditures so that the cost of production of each article shall be segregated as far as possible from all others. If the productive operations are at all complex this can be done only by distributing these items in the detail costs in proportion to their service or use in

the plant. It will be clear that the total costs will be the same under both methods.

88. *Interest on owned capital.*—The case where the manufacturer owns his plant would seem at first sight to be somewhat different, for here, apparently, he does not need to include interest charges on his investment, either in computing his factory cost or his total cost. A brief reflection, however, will show that this is not the case. If the owner of an enterprise cannot make a profit, over and above interest charges on his investment, it would be easier for him to lend his money to some other person who would pay him such interest and assume all the risks and anxieties of the business. He could then work for some one else and earn a wage, which would indicate that the wages of an operating owner should also be considered a part of the cost of production and should not come out of profits. It is clear, of course, that the manufacturer who owns his plant has a great advantage over one who rents his plant, since the latter *must* make a minimum profit to meet his interest charges, while the former is not necessarily in any danger even though his investment does not pay him the market rates of interest. From the standpoint of practical cost finding it would seem clear that these items should be distributed in the factory costs¹ if for no other reason than the requirement of correct proportionate allocation of all expenditures so far as is possible.

It is argued that the inclusion of these items in the factory cost may raise the total costs above the market price and that it is better to defer such charges till the end of the year, or such other period when the general books are closed, and then to make such an allowance

¹ This view is not held by all cost experts and accountants although the practice has been adopted by many manufacturing concerns.

as is desirable. In reply to this it may be said that costs are costs and it is far better and safer to determine them as accurately as possible and then if they cannot meet the market prices, proceed to reduce them by economies or better methods till the desired margin is secured.

89. *Taxes and insurance.*—These arguments regarding interest and rent are applicable also in their entirety to taxes and insurance, which are also sometimes considered as attributes of capital and included in the general costs. Accurate proportional allocation of costs requires that they also be distributed in the manufacturing expense.

90. *Defective material and spoiled work.*—It would seem logical at first sight to charge the cost of defective castings and spoiled work to the order number of the job in which these occur. Where the defective or spoiled part is one of a very large lot this procedure would be proper; or if the work is so unusually difficult that bad castings or defective workmanship is likely to occur to a greater extent than in the ordinary run of work, it is clear that the extra cost so incurred should be charged to the product or class of work concerned since it is, in general, a more costly line of goods to produce.

The cost of an occasional bad casting or spoiled part should not, however, be charged against the particular job in which it occurs. Such items of cost should be carried to a separate account (see Figure 15) and charged off in the manufacturing expense, thus distributing these losses as a light tax over the entire product. If the cost of occasional misfortunes is charged to the individual jobs in which they occur, some jobs will be penalized so as to raise their cost out of all proportion, thus tending to obscure what the true cost should be. Obviously, also, all such costs should be entered in the

records as separate items so that no confusion may arise in estimating upon new work where such occasional losses may not occur. All such losses should be reported on a special form and should, also, come under the eye of the superintendent. The report should give full information regarding the defective material or spoiled work, the names of all men concerned, the reason for the loss, etc. Furthermore, the total of the account to which these items are carried should be carefully scanned, as it is an index of the efficiency of certain phases of production.

Defective purchased material should, of course, be carried in a separate account if for no other reason than to fix responsibility for the entailed losses. Such losses, however, are also manufacturing expenses and should be so distributed.

91. *Lost time.*—In every enterprise there is usually a considerable amount of time for which payment is made and for which no return is received in productive effort. Thus there may be considerable time lost by stoppage of machinery for short spaces of time, temporary extinguishment of the lights, cleaning of machinery and in waiting for material, tools or information. It is clear that, in general, such costs should not be allocated to particular jobs if the cost records are to serve as a means of predicting future performance. Furthermore, lost time, like spoiled work, is a measure of efficiency in management. Much of the lost time in the majority of plants could be saved by careful planning of the work and careful examination and repair of machinery in advance. The general principle of planning work and repairs in advance is one of the cardinal principles of modern industrial engineering and is well worth the consideration of all managers. (See also Section 78.)

Lost time, like spoiled work, should be carried to a separate account (see Figure 15) and distributed in the expense. This also gives the management an opportunity to check up the total of such time losses and to exercise supervision over it in a manner not attainable if such losses are buried in the job costs.

92. *Engineering and development.*—In many enterprises there are certain expenditures, the distribution of which will vary with conditions. Engineering and similar work, for instance, may be for one of three purposes:

- (a) For the purpose of securing specific contracts.
- (b) For specific contracts already secured.
- (c) For the production of standard product either for orders on hand or to be received.

Engineering and other preliminary work performed for the express purpose of securing contracts is purely commercial in character and should be charged to selling expense. Work of this character may include designs, blue-prints and estimates of considerable cost, and, clearly, the manufacturing department should not bear an expense with which it is in no way concerned.

Should the contract be secured, and should the preliminary work be used in the actual construction, the cost of the preliminary work may be divided between selling expense and manufacturing expense; or, in some cases, it may be justifiable to charge it entirely to manufacturing. The latter should never be done if the contract for which the preliminary work was done is not secured. In that case it is a selling expense, pure and simple, and if entered in the selling expenses it has some significance; while it is not only poor accounting to charge it to manufacturing expense, but tends to becloud the latter.

In the case of specific contracts for products, which

are not likely to be built a second time, it is obvious that, as far as possible, all cost pertaining to the product should be charged against it. All engineering and special experimental work, special tools, etc., then become direct productive costs chargeable against the work with which they are connected. Some manufacturers consider all drawings and patterns as assets and charge their value to capital account. In the case of special contracts which are not likely to be repeated such a procedure is seldom justifiable. It is better and safer to charge all expenditures made on special product to the cost of that product.

Engineering and development work done on standard product which is passing through the factory in quantity is of a different character and cannot be allocated to jobs, but must be treated as manufacturing expense. It is, of course, often possible to segregate such expenses where they are incurred for specific lines of product, and charge them off against those particular lines; but in complex cases even this may be difficult.

Engineering and experimental work that has for its purpose the development of better manufacturing methods is clearly also a manufacturing expense; but similar work conducted for the development of new lines of product is somewhat different in character. Clearly also such work is not chargeable to selling expense. A good way of handling these expenditures is to carry them to a development or suspense account until it is decided that the line of product under consideration will or will not be built. If it is decided to put the line of goods into production this preliminary expense can be charged off against the line over an estimated quantity of product. Such a method of distribution must, of course, be approximate, but, nevertheless, it is much more accurate

than charging such expenses over other lines of product. If this method is not feasible or desirable, or if it is decided not to build the line of goods the development account must be closed into the factory expense and distributed by whatever method is in use. In any case great care should be exercised in carrying development work as an asset, as is sometimes done. If so treated and if the asset be at all of a perishable character, whether drawings, machines or engineering data, it should be depreciated as rapidly as possible by deduction from revenue account.

93. *Patterns, drawings and small tools.*—The problem of patterns and drawings is very similar in some respects to that of engineering and experimental work. Wherever patterns or drawings are made for specific jobs and are not likely to be used elsewhere, they should undoubtedly be charged directly to production. As has been stated, it is the practice of some manufacturers to carry patterns and drawings as an asset where they are used continuously in production. Great care should be used in doing this. At best, patterns are short lived when used, and if not used they soon become valueless. Drawings, though undoubtedly a true asset while in use in a going concern, are of little market value and should in any case be carried at a very low valuation. It is better to charge off such investments by averaging them over an assumed quantity of product. Thus pattern costs are often absorbed as a charge on foundry cost, and drawings can be absorbed in the manner suggested in the preceding section.

Short-lived, small, loose equipment in general, and hand tools which wear out rapidly, should either be carried at a very low valuation or renewed out of revenue and charged off as an expense.

In many manufacturing plants very large sums of money are tied up in jigs, fixtures and special tools. The problem of the extent to which it is justifiable to make such special tools is an interesting one, often involving other factors besides the element of cost, as, for instance, accuracy of form. In general, however, the making of special machinery should be justifiable from the standpoint of cost of production, but great care should be used in disposing of the cost of such tools. Special tools are, most often, applicable only to the work for which they are made, and, if the line of goods for which they are used should be discontinued or if the enterprise should go out of business, the value of such equipment is always problematic, and in many cases such material is worthless except as scrap. In the case of small equipment, such as jigs and drilling fixtures, it is an unwise policy to carry their value as an asset. Such value should be considered as a part of the cost of production of the particular line of goods for which the tools have been made and should be distributed over the cost of such goods. This usually involves the creation of a development or suspense account covering the original cost of such tools and an estimate of the probable number of parts to be manufactured to fully absorb this account.

In the case of large, special machines it may be desirable to consider them as a real asset. But, again, great care should be used in such a proceeding. Unless it is clear that such tools are likely to outlive their usefulness by the natural processes of wear and tear, rather than by obsolescence, they should be liberally depreciated at inventory time until their loss would not be a serious factor. To any one familiar with the collection of old special tools to be found in any factory operating on

mass production, this will be obvious. There is no doubt but that failure to appreciate the above principles lies at the root of many industrial failures.

94. *Improvements and repairs.*—A careful distinction should be made between improvements and repairs. Any addition which adds to the earning capacity is obviously an asset and should be so considered. But even here it is good policy to limit the minimum value of the improvements which are treated as assets since it is desirable, always, that charges to capital should consist of important items, the value of which as assets cannot be questioned. This minimum limit will, of course, vary with the size and character of the enterprise, in small shops being as low perhaps as fifty dollars; any betterments of lesser value being treated as repairs and carried to the expense account.

When a machine or other piece of apparatus is rebuilt or has extensive improvements made upon it, the changes may sometimes be such as will add materially to the producing or earning capacity of the apparatus and may be a true betterment that may be added to the assets. Care should, however, be exercised before doing so, that the producing capacity has really been raised and the inventory value of the apparatus actually increased.

Repairs of all kinds are of the nature of expense. They are also closely connected with depreciation, which is discussed in Chapter VIII. The detail in which repair costs should be collected and recorded will, of course, vary with the enterprise; but there are certain broad classifications that are fundamental and general, as, for instance, repairs to buildings, repairs to machinery, repairs to small tools and loose plant, repairs to furniture and miscellaneous fixtures (see Figure 15). Each of

these general divisions may be and usually is subdivided into smaller accounts, the detail often being minute in large plants. In any case the detail should be such that the responsibility of departments and foremen is clearly shown. This is usually accomplished, as before noted, by a system of standing order numbers (Section 54) to which labor and material are charged in the same manner as to productive work.

It is customary in many establishments to consider the material and labor actually used in making repairs as constituting the full cost of such repairs and no addition is made thereto for other expenses as in the case of a job made on a production order. This procedure, however, may in some cases be open to question. If repairs are made on a building, for instance, with material and labor bought directly for the work, it would be reasonable to charge any expense for supervision, purchasing costs, etc., to the cost of the repairs, but since no use is made of the machinery and equipment in making these repairs no other expense should be included in their cost. There are, no doubt, many repairs made on the equipment where the labor of the repair man and the supplies needed are the only expenses involved. But where much supervision is needed and extensive use is made of machinery and floor space to make repairs on equipment it seems reasonable that such work should bear its own share of burden just as though the work were being performed for a customer.

95. *Plant ledger*.—Besides locating repair and maintenance costs by departments an individual account should be kept with each building and machine and each group or class of apparatus the components of which are too small to list in individual accounts. Such a record is called a plant ledger. It is most conven-

iently formed by the card index method as illustrated in Figure 16. A card is made out for each building or machine and on this are recorded all repairs and all

PLANT LEDGER										NO. 48	
MACHINE <i>18" x 12" Lathe</i>					LOCATION: FLOOR <i>1</i> ROW <i>6</i>						
MAKER <i>Bradford Machine Tool Co</i>					OUR NO. <i>48</i>		MAKERS NO. <i>2146</i>				
PURCHASED FROM <i>Prentiss Supply Co</i>					PURCHASE PRICE <i>\$1500</i>						
DATE OF PURCHASE <i>12-6-12</i>					ESTIMATED LIFE <i>25</i>						
NEW OR SECOND HAND <i>New</i>					PROBABLE SELLING VALUE <i>\$300</i>						
WEIGHT <i>5020</i>		POUNDS			RATE OF DEPRECIATION <i>7%</i>						
DEPRECIATED VALUE AT END OF YEAR											
<i>13</i>	<i>1395</i>	<i>00</i>									

PLANT LEDGER CARD (FRONT)

REPAIRS, ADDITIONS AND ALTERATIONS AFFECTING DEPRECIATION					COST OF INSTALLATION	
DESCRIPTION	ORDER	DATE	CREDIT	DEBIT		
					FREIGHT AND CARTAGE <i>\$35</i>	
<i>Tapar Attachment</i>	<i>3406</i>	<i>10-1-12</i>	<i>35</i>	<i>00</i>	FOUNDATION <i>\$254.60</i>	
					INSTALLATION <i>\$65.20</i>	

PLANT LEDGER CARD (REVERSE SIDE)

FIGURE 16

charges in the piece of apparatus. Such a card, in connection with the proper depreciation of the asset, gives a life history and is a continuous inventory of the asset. The entire plant ledger, therefore, constitutes a con-

tinuous inventory of the equipment and in conjunction with the stores ledger, the cost ledger and the stock ledger forms a complete continuous inventory of all the material assets.

As before noted, only repair items which affect productive capacity are carried to the plant ledger. All others are charged off directly to expense. Small perishable tools as saw blades, scrapers and files are usually not included in small tool accounts, but are carried under expense supplies. It is a good policy, however, to keep account of the amount of these perishable tools and supplies issued to each workman, as well as a record of all breakage of small tools and loose plant.

Repairs and replacements may be the accumulated results of ordinary wear and tear or they may be necessary because of breakage through carelessness or overloading of apparatus. They are, therefore, variable in amount and should be averaged over a considerable period of time. Clearly, it is not logical to charge the entire cost of putting a new roof on a building to the particular work passing through at that time. In some plants it is customary to charge the cost of minor breakages to the job by which the breakage was occasioned. This is not a good cost-finding policy for even small items. All such costs should go into the manufacturing expense and be distributed over the product.

CHAPTER VIII

DEPRECIATION AND OTHER CHARGES

96. *General theory.*¹—Anything approaching a comprehensive discussion of this subject is far beyond the scope of this work and only enough will be inserted to indicate its place in cost finding. Among the assets of practically all enterprises are some items which constantly tend to waste away and decrease in value whether the business is active or inactive. Buildings waste away by reason of the action of the elements as well as by the wear brought upon them by work performed. Machinery, tools and furniture also wear out and must be replaced. Materials and supplies, worked and unworked, may depreciate to scrap value either from the action of the elements or by becoming obsolete through changes in design. Obviously such losses must be compensated for if the business is to continue and make profits.

A careful distinction should be made between losses on capital account and losses on revenue account. If an uninsured building is burned the loss so sustained is a loss of capital that is in no way connected with depreciation. No allowance which the owner can make for wasting depreciation of other assets can properly be used to replace the building and such replacement should come out of new capital whether taken from savings or borrowed elsewhere.

¹See also discussion of "Depreciation" in the text on "Accounting Practice."

If, however, the natural wasting losses of buildings and machinery are not provided for in the costs and as a consequence the balance sheet shows a deficit when such losses are provided for, the enterprise has suffered a loss in revenue account because of this procedure. Wasting losses of this kind are a just charge against production and as will be seen should be included in manufacturing expenses.

97. *Forms of depreciation.*—The detail in which cognizance is taken of depreciation will vary widely with the enterprise. Thus in the appraisal of public utilities the following forms of lessening value are often recognized:

- (a) Wear and tear or maintenance.
- (b) Physical decay or decrepitude.
- (c) Deferred maintenance or neglect.
- (d) Inadequacy.
- (e) Obsolescence.

Under wear and tear is included the ordinary wasting away because of use and the action of the elements. All machines tend to wear out, the paint on buildings wears away, fences must be constantly repaired, etc. The rate at which such wasting progresses will manifestly vary quite widely with the asset and service.

Many assets, such as buildings and machinery, even though kept in the best of repair will in time reach a state where repairs will no longer suffice and the entire asset must be renewed. A horse is a striking example of this form of asset. His shoes may be replaced, but no repairs or renewals can stay the gradual breaking down of his physical power. In time he must be replaced. Depreciation of this kind is called physical decay, or decrepitude.

In refined methods of appraisal, account is taken of

the value of an asset, as it really exists, and the value it would have if properly repaired. The difference in these two values is termed deferred maintenance or neglect.

Sometimes an asset must be replaced because it is no longer adequate for the work even when in the best of repair. Thus a steam crane may become too small for a growing industry. Such decreased value is known as inadequacy or supercession and, obviously, has no connection with wear and tear in the ordinary sense.

An asset may become of less value because of the introduction of new methods or machines. This may occur when the asset in question is as good as new, so far as production is concerned, yet the manufacturer cannot afford to be without the improved apparatus. Such lessening of value is called obsolescence and is one of the wasting losses which is often most difficult to foresee and make provision for.

In appraising public utilities or in settling the differences of opinion between partners or stockholders and bondholders all of the above classes of wasting losses may be and are taken into account. But for the ordinary enterprise where the owner is desirous of knowing only the total of such losses it is usual to group them all under two heads, namely, depreciation and obsolescence, depreciation including wear and tear, decrepitude and neglect, and obsolescence including inadequacy also.

98. *Relation between depreciation and repairs.*—It will be clear that repairs and renewals tend to compensate for wasting losses, but from the foregoing it is also clear that in most cases complete compensation for depreciation by means of repairs is not possible. In large plants consisting of many units that wear out so

quickly as to need frequent and complete renewals such compensation is sometimes possible. In large railways, also, where renewals and additions are constantly being made, it is often considered that depreciation is thus compensated for. But it is evident that in such cases there should be an obvious increase in the productive capacity of the plant to insure against gradual lessening of the assets. Even when a machine or building is kept in good repair there must be, as already noted, a gradual lessening of its productive power that cannot be stayed by repairs and renewals.

On the other hand, extensive repairs and renewals may be made on an asset which may be considered as increasing its earning value and hence increasing its inventory value. Thus a machine may have a depreciated value of \$5,000, when extensive repairs and renewals amounting to \$1,000 may be expended upon it. If the producing power of the tool is thus increased it would be allowable to increase the value of the machine to, say, \$5,500 and make such an entry on the plant ledger. But it should be very obvious that the earning capacity has been augmented before the inventory value is raised, otherwise the cost of the repairs should be carried to the manufacturing expense account.

99. *Determination of depreciation.*—All intelligent managers admit the necessity of making allowance for depreciation, but there is much diversity of opinion regarding the methods to be pursued in doing so. One of the reasons for this diversity of opinion is that enterprises vary widely and, in addition, it is not always expedient to make as large a deduction for depreciation as may seem desirable. An old and still common method is to make an annual visual inventory of every asset, the total value so obtained being the apparent inventory

value of the plant. By comparison with the inventory of former years the depreciation is determined and deducted from gross profit before declaring dividends. While such a method seems practical and satisfactory for enterprises which close their books annually only, it has several disadvantages and there are objections to its use. A visual examination may or may not be sufficient for a correct valuation of the asset, and such methods of valuation require judgment backed by long practical experience. A periodical visual examination is, however, a good check on the methods to be described.

100. *Original, present and scrap values.*—It may be noted in passing that the value of any asset will vary with the purpose for which such valuation is made. There is a great difference between the value of a plant viewed as a going concern and its value at forced sale. In appraising public utilities several kinds of value are recognized; as, for instance, “service value” or the value of the asset as measured by its effectiveness, the value of “cost of reproduction” at current market prices, etc. For the usual case of factory inventory, however, the original cost, residual or scrap value and the present value are the most important with which the factory manager and cost-keeper are concerned.

The original cost is the cost of the asset plus freight and cartage, but excluding foundation and erection costs, since these are irrecoverable and should be included in preliminary expense and written off independently. Some accountants include erection costs in the original value on the ground that they are not expenses properly chargeable to the current period and that depreciation charges eventually will dispose of them. This view, it would seem, loses sight of the fact that the assets are thereby unduly inflated. Depreci-

ation has to do with actual shrinkage. To avoid a large expense in one period, a deferred or suspense account to be gradually written off should be charged with those erection costs.

The residual or scrap value of an asset is its estimated market value at the end of the estimated producing life.

The present value of an asset is the value found by subtracting the total depreciation to date from the original cost, making due allowance for any renewals that have been carried to the plant ledger account of the asset.

101. *Rate of depreciation.*—In best practice some definite rate of depreciation is decided upon which will reduce the asset from its original value to scrap value during its estimated life. These depreciation rates may, however, be varied from time to time if renewals or extensive repairs make such procedure necessary. The general method may be illustrated as follows: Suppose an asset has an original value of \$5,000 and when installed its estimated producing life is set at 20 years, at the end of which period it is estimated that its scrap value will be \$500. The total depreciation which must be cared for, not considering modifying repairs or renewals, will be, therefore, $\$5,000 - \$500 = \$4,500$. Suppose, now, at the end of ten years the book value of the asset has been reduced by the method of depreciation in use to \$2,000, and at that time the asset receives repairs and renewals amounting to \$1,000. If such renewals bring the asset up to somewhere near the producing value of a new piece of apparatus of similar kind, it is clearly logical to increase the book value to, say, \$2,500 and readjust the rate of depreciation if desirable. On the other hand, the asset may be found to be in first-class repair at the end of the fifth year, say, but

also be found to be almost valueless as a producing asset because of new inventions or changes in processes. Obviously the scrap value and producing life depend on many factors and must, as a rule, be estimated.

There are several methods advocated and in use for fixing the rate at which the asset shall be depreciated from the original cost to scrap value. This is necessarily so since conditions vary and personal opinions govern these matters to a large degree. Space will permit only a brief discussion of the two most important of these methods, namely, the percentage-on-original-cost method and the percentage-on-diminishing-value method.

102. *Percentage-on-original-cost.*—Under the percentage-on-original-cost plan the total depreciation or the difference between the original cost and the scrap value is divided by the estimated producing life and the dividend is the amount set aside annually for depreciation. Thus in the preceding example the annual depreciation would be \$225. This method is much used because of its simplicity.

103. *Percentage-on-diminishing-value.*—Under the percentage-on-diminishing-value method a definite percentage is taken from the depreciated value of the former year. Thus in the preceding case if the rate of depreciation be taken at 10 per cent and this percentage is taken annually from the depreciated value of the year before, the same results would be obtained as with the other method. Some managers prefer this method because the depreciation is somewhat heavier in the earlier years, when repairs are small, and lighter in the later years, when repairs are presumably greater, thus equalizing the charges that must be made against the asset during its productive life.

Whatever the plan used for fixing the rate of depre-

ciation, these methods make it possible to provide for such charges continuously and in advance, instead of waiting until the end of the year. Provision is usually made on the plant ledger sheet, Figure 16, for noting the yearly depreciation of each asset and from these sheets the weekly or monthly total depreciation can be determined and distributed with the factory expense.

104. *Depreciation a manufacturing expense.*—It should be specially noted that depreciation is a manufacturing expense and not a general expense, as it is so often considered. There is no logical justification for distributing depreciation as an even layer over the total shop costs, since the rate of depreciation varies so greatly with various assets. At the least it should be allocated by departments in common with all manufacturing expenses and all the arguments presented later on, looking to a still more accurate distribution of all costs, are applicable, also, to depreciation.

105. *Typical rates of depreciation.*—The rates of depreciation will, as before noted, vary widely with the asset and service. A single flat rate applied to all assets is unintelligent and misleading. Careful classification should, therefore, be made of all assets and proper rates assigned, having in mind the controlling factors, namely, original cost, estimated life and scrap value. The following table, taken from the author's "Principles of Industrial Organization," gives average rates for buildings and machinery kept in a good state of repair. These rates also include allowance for obsolescence. Corresponding rates are given for both of the methods of depreciation which have been discussed.

ESTIMATED LIFE AND FACTORS OF DEPRECIATION

Asset.	Probable life of asset in years	Ratio of scrap to original value	Percentage on original cost	Percentage on diminishing value
Brick or steel frame buildings, easy service	40	0.10	2.25	5.5
Brick or steel frame buildings, severe service.....	20	0.10	4.5	11.
Good wooden buildings, easy service	30	0.10	3.	7.5
Good wooden buildings, severe service	15	0.10	6.	14.
Steam engines	15 to 30	0.10	6 to 3	14 to 7.5
Steam boilers	15 to 30	0.10	6 to 3	14 to 7.5
Boiler-room feed pumps.....	20	0.05	4.75	14.
Engine-room instruments and gauges	10	0.05	9.5	26.
Steam piping, valves and fittings..	10 to 15	0.05	9.5 to 6.3	26 to 18
Portable engines and boilers....	10	0.05	9.5	26.
Gas engines	10 to 15	0.05	9.5 to 6.3	26 to 18
Turbo-generators	20 to 30	0.10	4.5 to 3	11 to 7.5
Electric generators	20 to 30	0.10	4.5 to 3	11 to 7.5
Electric motors	20	0.10	4.5	11.
Storage batteries	10	0.05	9.5	26.
Switchboard and instruments....	15	0.05	6.3	18.
Heavy machine tools.....	25	0.10	3.6	9.
Light machine tools.....	15 to 20	0.10	6 to 4.5	14 to 11
Shafting, hangers and pulleys...	20 to 30	0.05	4.75 to 3	14 to 9
Belting	10 to 25	10 to 4.0

06. *Writing off depreciation.*—Some accountants use the sinking-fund method of caring for depreciation. Under this method such an annual sum is set aside that at compound interest it will amount to the original cost of the asset, minus the scrap value, by the end of the producing life. There are several objections to this method. First, it is unnecessarily cumbersome, mathematically, and second, as usually applied to ordinary depreciation, it is faulty in theory. Depreciation is an allowance for losses that have already occurred. If this loss is \$200 yearly that amount should be set aside and not the amount which will accumulate to that value in a period of years. Sinking-fund methods, however, are strictly applicable to the writing off of patents, franchises, development expenses, or in fact any definite obligation which must be met at a definite future date.

The amounts set aside for depreciation should, then, be distributed against production, credited in some manner to the equipment accounts and debited to the depreciation accounts. The exact method of handling depreciation reserve is a problem for the accountant and financier. Sometimes it is actually put at interest outside the business and often, on the other hand, it is retained as working capital.

107. *Sundry expenses.*—In manufacturing establishments, particularly, there are many items of expense that are neither labor nor material and which are not large enough to warrant the opening of separate accounts in the ledger. The number and amount of such items will, naturally, vary with the enterprise and its magnitude. Thus gas and telephone service, which are examples of these items, may be of importance in a large works, but neither one may warrant segregation in a small plant. It is customary to group all such small items into a so-called sundries expense account. Care must be taken, however, that such accounts do not become dumping grounds for all sorts of unauthorized expenditures. All items entering into such an account should be properly authorized and vouched for, and no item should be entered therein that should logically go into any other account. Many of such items will appear in the form of bills payable from outside creditors, but all internal expenditures of this kind should be made on written authorization and recorded and paid for only when properly vouched for.

108. *Character of general expense.*—It has been shown that general expense is logically divided into administrative expense and selling expense, though in small enterprises this distinction is not always made. As enterprises grow in magnitude, however, this division be-

comes more important and these expenses should be carefully separated so that the heads of the departments concerned may be held responsible for their proper shares. In some cases where certain officials have duties that lie in both fields this may mean a more or less arbitrary division of their salaries, but even such an arbitrary division is better than none at all.

The character and classification of the expense items making up administrative and selling expense require little explanation. The classification shown in Figure 15 is in accordance with common practice. The detail into which these expenses may be divided will, of course, vary with the enterprise. What may be a small item in one case may be a very large one in others. The majority of these general expenses will appear as bills or vouchers, though there may be many items for which production orders may be issued and the costs carried to the cost ledger and thence to the general accounts.

CHAPTER IX

DISTRIBUTION OF FACTORY EXPENSE

109. *General.*—From the foregoing it will be clear that while the cost of direct labor and direct material can, in general, be allocated with a fair degree of accuracy to the jobs into which they enter, the problem of distributing the factory expense so that each job shall bear its share of burden is a difficult problem and one that seldom admits of an accurate solution. Expense items differ in their characteristics and industrial enterprises themselves vary so widely both in size and character that it is not possible to formulate any one system of distributing expense that will be universally applicable and will give accurate results.

Nevertheless, it is essential that these expenses be allocated as closely as possible, especially where several lines of product are manufactured. Not only should each production order be charged with expense in proportion to the use it has made of the manufacturing facilities, but if close watch is to be kept of these expenses their distribution should show the departmental responsibility for their creation. On the other hand, managers are usually opposed to complex systems and methods and are content with a fair degree of accuracy. Nearly all cost-finding systems in use, therefore, are compromises which give approximate costs only. A number of these approximate methods are in wide use and it may be helpful to discuss briefly the characteristics and limitations of the most important ones. It will be understood also

that the present discussion refers to the distribution of factory or manufacturing expense, the distribution of general expense being treated separately later on.

The basic principle of all of these methods is to use some tangible factor of the job as a basis of comparison by which to measure the indirect expense which should be charged against it. It will be remembered that direct material and direct labor are tangible factors that attach themselves to all jobs in a direct and measurable fashion. The time expended upon a job is also a factor that can be determined accurately, whether it be the time of the workman himself or the time of a machine which has been used. Practically all systems of expense distribution assume that one or more of these tangible factors is a measure of the proportionate amount of expense that the job should bear. The most important of these systems which will be briefly discussed are:

- (a) Distribution by percentage on material cost.
- (b) Distribution by percentage on labor cost.
- (c) Distribution by percentage on prime cost.
- (d) Distribution by percentage on man hours.
- (e) Distribution by machine rates.

A more advanced and more accurate method known as distribution by production factors deserves special attention and will also be discussed. For simplicity it will be assumed at present that these systems are applicable to the distribution of the factory expense as a whole; the limitations to this supposition will be discussed later.

110. *Distribution by percentage on material cost.*—In this method of distributing the expense it is assumed that the burden varies directly with the amount or cost

of the material that enters into the product. Suppose, for instance, that a machine is built involving an outlay of \$300 for direct labor and \$100 for direct material. Suppose, further, that during the period of its construction the total expenditure in the factory for material is \$2,500 and the total expense for the same period is \$5,000. Then by this method of distributing expense each dollar's worth of material that goes into a machine should carry with it into the cost thereof $\frac{\$5,000}{\$2,500} = \$2$ of factory expenses. The expense which the job in question must bear is therefore $\$100 \times \$2 = \$200$, and the factory cost will be:

Direct labor =	\$300
Direct material =	\$100
Expense =	\$200
	\$600

111. *Advantages and defects.*—It will be clear that in a simple continuous process involving the production of only one commodity, as is the case in a rail mill or a cement plant, where every particle of the product makes the same use of all the facilities of the plant, the foregoing system will often be adequate. It is sufficient, in fact, in such simple cases to divide the entire cost of production by the total weight or volume of the product and establish unit factory costs that are fairly accurate. This is not because of any inherent accuracy in the method, but because in these simple cases allocation in a distributive sense is not necessary. All that is required is division of the expense over a uniform product. In other cases, also, where the material value entering

the product is very large compared to the direct and indirect labor cost this method may be sufficiently accurate.

If, however, more than one commodity or more than one variety of the same commodity is manufactured, the method of unit costs is clearly inaccurate unless each unit of each line of product makes equal use of all factory facilities. Furthermore, if the cost of the material is used as a basis, it is obvious that a line of goods involving expensive material will be burdened more than one in which a less valuable material is used. Thus two pieces of jewelry may be manufactured, alike in every respect, and employing the facilities of the factory to exactly the same extent, one of them being made of gold and one of some less valuable material. Clearly the product made of the more valuable material will be compelled under this method to carry more than its just share of expense.

Despite these obvious defects, however, the method is often useful and sufficiently accurate in handling such departments as foundries and porcelain works attached to factories of the intermittent types, especially if the product of these departments is fairly uniform in character and size and is passed through in large lots for stock orders. Its limitations are obvious where the product is varied in quantity and size.

112. *Distribution by percentage on labor cost.*—In this method of distributing the expense it is assumed that the burden varies directly with the direct labor expended upon the job. Thus with the data assumed in Section 110 suppose that the total direct labor for the period is \$5,000. Then in the preceding example the expense which every dollar of direct labor should

carry into the cost of the machine will be $\frac{\$5,000}{\$5,000} = \$1.00$

The expense which the job in question must bear is therefore $\$300 \times \$1.00 = \$300$, and the total factory cost will be:

$$\begin{array}{r}
 \text{Direct labor} = \$300 \\
 \text{Direct material} = 100 \\
 \text{Expense} = 300 \\
 \hline
 \$700
 \end{array}$$

This result, as might be expected, differs materially from the cost obtained on material as a basis, since there is no connection between the relative amount of material and labor that enter into product. The amounts assumed above for these items, while taken at random, are entirely probable.

113. *Advantages and defects.*—In shops where the product is closely similar in kind and does not differ greatly in size this method may, in many cases, give results accurate enough to justify its use. Because of its simplicity and because wages are such an important and evident part of the cost of production, this method has been and is still in extended use. It has, however, serious limitations.

First, this method does not discriminate between the cost of work done by a rapid workman and the cost of work done by one less rapid. Thus a job which takes a rapid man receiving 60 cents per hour four hours to complete is burdened with the same expense as a job done by a slower man earning 40 cents and requiring six hours of his time, and this method of distributing the expense does not differentiate between these two in the final shop costs. Yet the slower man has made greater use of the shop facilities, power, heat, lighting, floor space, tools, etc., and clearly it has cost more to pro-

duce the work with the slower man. Furthermore, because of the decreased rate of output due to the slower man, there is less total product over which to spread the expense and each part must bear a greater proportion as the rate of product falls, since, as already explained, expense does not vary directly with product, but increases relatively as production decreases.

This method also fails entirely to differentiate between the cost of large work and the cost of small work, and the error involved in its use may become large where the size of product and the size of the machinery required vary widely. Thus the expense charged to a job involving \$10 worth of labor by a mechanic using a file, only, is exactly the same under this method as that laid upon a job involving the same labor charge, but done on a very large boring mill, requiring the use of much greater floor space, heating, lighting and power, as well perhaps as the service of a large overhead crane. The work done on a very costly automatic machine will, under this method, bear practically no expense burden, though it is evident that the interest charge alone is much greater for the automatic machine than for hand work which may bear heavy expense charges.

It will be evident, however, that in shops where the parts manufactured are of approximately the same size and character this method may be fairly applicable. The same will be true of very large plants where the volume of work is so large as to permit of careful classification and departmentization so that the work in each department is similar in size and character. In such cases a different percentage may be necessary for each class or department and, obviously, this departmental method will give more accurate results in plants doing mixed work than can be obtained by a flat rate over the

entire product. It may be noted in passing that departmentization may not always give the desired result. If one department, for instance, is devoted entirely to generators, another to motors and another to transformers, great differences may still exist in size and character of parts within each department. If, however, the departmentization groups all lathes of one approximate size together, all the large boring machines together, and so on, this method is clearly more applicable. This matter will receive further attention in a later section.

114. *Distribution by percentage on prime cost.*—In this method it is assumed that the expense varies directly with the prime cost. Thus using the same data as in the preceding examples the expense which every dollar of combined direct labor and material must bear will be

$$\frac{\$5,000}{\$5,000 + \$2,500} = \$.666 \quad \text{The expense, therefore, for}$$

the job under consideration will be $(\$100 + \$300) \times .666 = \$266.6$, and the factory cost will be:

Direct labor =	\$300
Direct material =	100
Expense =	266.6
	\$666.6

115. *Advantages and defects.*—This method has the same inherent defects and limitations as those previously discussed, since it combines the bases of both of them. Where the value of the direct labor entering into the product is small compared to the value of the material, the method approaches the percentage-on-material plan of distribution. On the other hand, if the

material value is relatively low, the method approaches the percentage-on-labor plan of distribution, and in either case involves the errors and limitations of those methods.

In the general case of a factory making a varied product, both as to character and size, one piece may have a relatively high labor value and the very next one may have a relatively low labor value, and distribution by this method is, in such a case, not only inaccurate, but illogical. A manufacturer doing a mixed business will find difficulty in competing on jobs involving much material and little labor if his costs are based on this method. Even though other work which he performs may justly receive a large amount of expense, the selling of a product consisting of little but material does not, in general, involve much factory expense. In fact, in the extreme case, such goods may not even enter the factory, but pass directly from the source of supplies to the customer.

116. *Distribution by percentage on man-hours.*—In this method of distributing the total expense it is assumed that the expense which any piece of work should bear is directly proportional to the number of man-hours that have been expended upon it. Suppose that, as in the example already used, the total direct labor is \$5,000 and is made up of 12,500 hours of labor at varying rates. Assume also that the total expense is \$5,000 and the total material is \$2,500, as in the previous cases. Assume also as before that the direct material used on the job under consideration is \$100 and the direct labor is \$300; but assume further that the latter is made up of 1,200 hours of labor at 25 cents per hour. Then the expense per man-hour chargeable against every job will be $\frac{\$5,000}{12,500} = 40$ cents, and the expense

which must be allocated to the job under consideration will be $1,200 \times .40 = \$480$, whence the shop cost of the job will be:

Direct labor =	\$300
Direct material =	100
Expense =	480
	—
Total =	\$880

117. *Advantages and defects.*—It might seem at first glance that this method would give the same results as distribution by percentage on labor alone and this would be the case if all men received exactly the same rate of wages. Thus suppose that the total direct labor of \$5,000 consisted of 20,000 hours at 25 cents per hour. Then the expense chargeable against each man-hour would be $\frac{\$5,000}{20,000} = 25$ cents and the expense chargeable against the job under consideration would be $1,200 \times .25 = \$300$ or the same as in the method of distribution by percentage-on-labor.

On the other hand, if the job under consideration received 1,500 hours at 20 cents per hour or a total of \$300 as before, the expense allocated to it by this method would be $1,500 \times .40 = \$600$ and the shop cost would be $\$300 + \$100 + \$600 = \$1,000$. Again, if it received 500 hours at 60 cents per hour, making the same total labor cost as before, the expense chargeable to it would only be $500 \times .40 = \$200$, and the shop cost would only be \$600. It will be seen, therefore, that under this method the total labor cost may be the same on different jobs, but the expense may vary widely. This method, therefore, takes into account the value of time

spent, the factory cost decreasing and increasing with this factor. A job done by a high-priced man in a short time and with minimum use of the shop facilities is not burdened so heavily as one done by a cheaper and slower man who uses the shop facilities for a much longer period. This is logical, and in this respect the method of percentage on man-hours is an advance on the systems previously discussed.

The percentage-on-man-hours plan would also seem to be more logical, in general, than the percentage-on-labor method for other reasons. A great many of the principal items of indirect cost as, for instance, heat, light, depreciation, rent, insurance, taxes and interest, etc., are more fairly proportional to time than to wages or labor costs. There is no reason for assuming that the proportion of these items will be high where wages are high and low where wages are low; in fact, such items as supervision are likely to be highest where labor costs are lowest. The interest on investment may be very high where low-priced labor is employed on operating automatic and semi-automatic machines.

On the other hand, this method is no better than the percentage-on-labor method, so far as differentiation between the use of equipment of different value and size is concerned. The same hourly rate is applied to a hand worker as is applied to a \$20,000 boring mill. This results in overcharging small, cheap product and undercharging the larger and more expensive work. When applied over an entire factory, which is engaged in making a wide range of work, competition with the small articles of product becomes difficult if such competition is against other manufacturers specializing in these small articles.

It will be evident that this method can be applied with

accuracy only when the work is of fairly uniform size and character, but it should also be noted that the errors of this method, like those of the percentage-on-labor plan, can be obviated to some extent by careful departmentization. Where tools and processes can be grouped so as to obtain equal conditions for similar types of machinery and similar processes this plan may often be used with success. Like the preceding systems it has the virtue of simplicity and in many cases this is no small advantage.

118. *Inadequacy of foregoing methods.*—It will be clear that under all the plans of distributing expense that have been discussed an averaged result is ultimately obtained. None of these methods takes account of the fact that expense does not weigh equally over all parts of the productive activities. It is for this reason that these methods apply with some semblance of accuracy only where the conditions are more or less uniform, where the wages paid do not vary greatly, where the size and character of the equipment do not differ and where the lines of product are not diverse in character. In other words, where the conditions are simple, only simple methods are required. It is for this reason, also, that any of the methods that have just been discussed, apply more closely when the factory can be departmentized so as to group machines and processes of similar kind and equal size together. Where this can be done and each department is accurately charged with its share of expense, almost any method of dividing the departmental expense will give fairly satisfactory results since each man or tool in each department is equally taxable. Minute departmentization of this character is not usually possible, however, and where these simple conditions cannot be obtained and accurate

costs are desired the averaging methods so far described are not applicable.

The reasons for this are fundamental. When factories were smaller and machine processes did not constitute so large a factor in manufacturing, wages or time did, no doubt, serve as a satisfactory measure of expense, especially where only rough costs were required. But neither wages nor labor hours can be taken as a measure of expense in modern factories where the product varies both as to size and character. It is true, of course, that in all complex cases a certain amount of averaging must be done, but this can be minimized and the results made more accurate than those obtained by the methods heretofore outlined.

The majority of factory expenses do not attach themselves to labor or to material, but gather around machines and processes. Consider, for instance, the items of interest and depreciation. In the averaging method referred to, these expenses are distributed over the entire product with other items of expense, and lose their identity entirely so far as any particular machine or process is concerned. Yet these items of expense are intimately connected with individual machines or processes and are definite parts of their cost of operation. They are not connected with the wages of the operator since they continue to accrue even when the machine is idle. In fact this is one of the fundamental defects in using wages or labor hours as a basis of expense distribution. Many items of expense continue to accrue even when no wages are being paid and the factory is closed down. It is not logical that an article made by hand labor should bear an equal portion of the expense with a part machined on a large boring mill, yet this is just what the averaging methods accomplish if applied

over diverse product of varied size. Similar reasoning applies to such expenses as heat, light, power, insurance, rent, taxes, repairs and in fact to the greater part of shop expense.

It should be remembered also that the amount of these expenses may be very large. Shop expense frequently amounts to 100 per cent, and sometimes goes as high as 150 per cent, of the direct wages. It is fully as important that this expense be accurately allocated as that the labor cost shall be correctly recorded. This is particularly true where it is desired to know the cost of different sized articles or different lines of goods with a view to meeting competition on a correct basis.

119. *Machine rate.*—When the traditional influence of wages and labor hours are once discarded it then becomes clear that many of the items of expense are naturally connected with the use of equipment of one kind or another. Rent, insurance, taxes, interest and depreciation are connected with the use of buildings and machines. Heating, lighting and power are likewise connected as much with machines as with men, and if costs are to be intelligently applied this factor must be taken into account. This aspect of cost finding was recognized in mixed manufacturing long ago and so-called machine rates have long been in use. In fact, the conception is a very old one and had its origin, no doubt, in an instinctive effort to discharge the interest on investment and wear and tear of the machine in some proportion to its size and cost. It probably was a natural result of the growth in the variety and size of machines.

In its original form the machine rate made no effort to insure accurate allocation of the total factory expense, but attempted rather to equalize in some degree such items of expense as clearly attached themselves to ma-

chines and processes and, perhaps, took into account the probable life of the machine. All machines and processes were divided into a few classes designated perhaps by letters or numbers. A graduated hourly rate was then assigned to each class and each piece of work done on every machine was taxed accordingly and in proportion to the time during which it made use of the utility concerned.

As the need for more accurate costs grew it was a most natural tendency to extend the method to cover hand workers as well as machine processes. Under such systems the hourly burden imposed on the work for the services of a skilled hand worker might be 40 cents per hour, while the hourly rate for a large machine tool might be \$5 per hour. Furthermore, as the need for accurate costs became still more important, it was most natural to extend this system so as to distribute the total factory cost, if possible. The fundamental principle, then, in the modern machine rate is to assign to each machine its own share of expense for a given period of time. This total expense is then divided by the estimated number of hours that the machine or process will be in use for this same period, this estimate, of course, being based on previous records or some similar source of information. The dividend so obtained is the hourly rate which must be applied to each job using the tool or process. It is obvious that a close and proportionate allocation of all expenses will be accomplished if each tool and process is in operation the exact time which has been estimated and if no additions or deductions are made to the equipment and working force for the period considered. It should be noted that in using this method a machine in this sense will be any machine or process from a vise to the largest tool. In fact, as

will appear presently, allocation in this manner may be made to any place where men may work involving the use of expense items.

120. *Advantages and defects.*—Viewed simply as a means of equalizing interest and depreciation the simple machine rate may justify its use in some instances; but as ordinarily used as a means of distributing the total expense it is greatly inferior to the averaging methods already discussed. It will at once be recognized that the allocation of all expenses by machine rate necessitates considerable preparatory work. In a large factory which is composed of a number of buildings, each building containing machines and processes similar in size and kind, an intelligent allocation of many expenses could be made to each department and these departmental expenses could easily be distributed by machine rate if certain other difficulties to be discussed could be properly dealt with. For in such a case this departmental expense could be accurately allocated to the building as a whole and each machine theoretically should share equally in this burden. Such conditions are, however, rather rare. In a small factory where there are few tools of each size and kind, and where the processes are varied, a considerable difficulty may arise in justly allocating the expense chargeable to each utility. But even in small factories of this type it is possible to make a fairly consistent allocation of a large portion of the burden.

It should be noted that although a large part of the expense naturally gathers around machines and processes there are other expenses that do not naturally so attach themselves. Thus general labor and supervision, crane service, transportation service and similar expenses are not so clearly assignable by machine rate and

may need some form of special determination. But all of the above objections can be more closely met than the inherent defects of the averaging methods. There is, however, one fundamental defect of the simple machine rate which destroys its accuracy unless special means are taken to offset its operation.

It will be remembered that the hourly rate is established by estimating either upon the basis of past experience or by pure estimate the probable number of hours the machine or process will be in operation during the period considered. Obviously the accuracy of the hourly rate will depend on how closely the actual operating time of each machine corresponds to the estimated time. Should a machine be in operation more than its estimated time, as might occur in overtime work due to a hurry job, an overcharge of expense is made. On the other hand, should the machine fail to operate the full estimated number of hours because of lack of work or a breakdown, an undercharge of expense will be made. It may occur, of course, that these two errors will balance each other, but in general they will not and there is no way of knowing just what the error is. When the volume of work is decreasing, the large machines become idle first; this may lead to a serious undercharge which cannot be detected until it appears in the general accounts, too late, perhaps, to remedy the difficulty. Furthermore, it is not possible, as a rule, to estimate in advance just how long any machine will be in operation, even when the records of past performances are available. It is not always possible to wait until the end of the month to find out how long each tool has been used; so that, in general, the estimate of the operating time of any tool or machine must be approximate. The simple machine rate as outlined depends, there-

fore, for its accuracy on all factors remaining fixed, a condition which seldom or never occurs.

121. *Supplementary rate.*—Notwithstanding these serious defects which eliminate the simple machine rate from most of the modern systems it possesses one characteristic which is possessed by no other system and which has been the means not only of keeping it alive, but which promises to make it more important in the future. The machine rate does take into account the difference in the cost of work done on different sized machines and by different processes. Some of the relations which it establishes between the machine or process and the work done are fairly permanent and do not vary with the volume of business transacted. For this reason it probably forms a better basis for a cost system than any other plan.

A. Hamilton Church has endeavored to make the machine rate more serviceable by the use of a so-called supplementary rate, the operation of which will now be described. All expenses which can be so allocated are apportioned to machines and processes proportionately. These allocated expense items are charged off as a machine rate, as already described. A record is kept of all such expense so distributed and at the end of the month, or whatever period has been selected, the total sum of this distributed expense is subtracted from the total shop expense which has accrued during the period. The difference so obtained is, of course, the expense which remains to be distributed. It represents that which has not been distributed by machine rate, due to idleness of the machines, plus all other general shop expenses which cannot be allocated to machines or processes. If all machines and processes have been in operation the exact time used in estimating the machine

rate the undistributed expense will, obviously, consist entirely of general shop expenses. Whatever the content of this residual expense, it is charged off as an hourly charge over the jobs that have gone through during the period, or it may be distributed as a percentage on the expense already apportioned to them by the machine rate.

Theoretically at least, this method makes a more intelligent allocation of the bulk of the expenses and with the supplementary rate the total expense will be distributed with as much certainty as by the averaging methods. The supplementary rate serves also as an index of the volume of work in the shop. A rising supplementary rate would indicate lack of work, while a falling rate would indicate reverse conditions. In principle, at least, the machine rate, with the supplementary rate, offers an attractive solution to one of the problems of cost-finding.

It will be obvious, also, that in many cases approximate machine rates can be assigned without great difficulty. In the general case of mixed manufacturing, however, the assigning of the machine rate requires considerable preliminary work if any approach to accuracy is to be obtained and this fact constitutes the greatest defect of the method.

CHAPTER X

PRODUCTION CENTERS AND THE SUPPLEMENTARY RATE

122. *General principles.*—The method of distributing expense by the machine rate and the supplementary rate has come into prominence through the writings¹ of Mr. A. Hamilton Church, who has investigated the plan very thoroughly and whose reasoning presents a somewhat different point of view from that upon which the old averaging methods are based. Under this reasoning the shop or factory, instead of being regarded as an organized whole, as in the averaging methods, is regarded as “a collection of production centers each differing from the other, with certain common connecting bonds” which are the averaged or general factors in the expense charge. “A production center is, of course, either a machine or a bench at which a handicraftsman works. Each of these is in the position of a little shop carrying on one little special industry, paying rent for the floor space occupied, interest for the capital involved, depreciation for wear and tear and so on, quite independently of what may be paid by other production centers in the same shop. Then in addition to this there will be a separate debit representing those items of expense which can be treated only as an average all-round charge.”

¹ See “The Proper Distribution of Expense Burden,” by A. H. Church, also “Production Factors in Cost Accounting and Works Management,” by the same author.

123. *Production centers illustrated.*—This conception can be made clearer by conceiving the factory to consist of a large number of small productive units separated physically from each other and supplied with heat, light and power from a central station in such a way that all such services can be measured and debited against each little shop. These little shops will necessarily vary in size and in the size and character of their equipment.

If, now, the owner of this factory rented some of these little shops to employés and operated others himself he would not charge off the operating expense by any system of averaging. He would, necessarily, keep an independent account with each production center so as to be able to show the exact amount of each service (or production factor) that he supplies to each little shop. Some of these services, such as insurance, depreciation, taxes and supplies, could be accurately recorded and charged to each center. Others, such as heat, light and power, could not be charged with quite the same accuracy, but accurately enough for all ordinary purposes. Other items of general service, such as transportation and telephone service, might give still greater trouble; yet a fair approximation could be made even in these cases; and lastly, there might be a small residuum of expense so general that it might have to be distributed by some averaging method.

The workman renting one of these little imaginary shops would then receive a periodical statement of his indebtedness to the owner. He could add thereto any other expenses peculiar to his work and by estimating the number of hours that his machine was in operation he could compute a machine rate that would discharge all of his expense in the manner already described. By

means of a supplementary rate, as previously explained, he could also care for any other expense which could not be so controlled and also for the difference between the actual and the estimated number of hours that his machine was in service.

124. *Application to actual conditions.*—It would seem that these conditions do not change simply because the imaginary walls are taken away from these little shops and a large building housing them all is erected over them. Mr. Church's argument that this method is the only accurate one of finding costs seems logical. The functions of a manufacturer are several fold. He may be an owner or he may be a renter. He may supply his own power or he may buy it. He may furnish his own heat and light or he may depend on others for these services. Viewing the manufacturer from this standpoint it is clearly more logical to segregate his expenditures according to functions than it is to segregate them according to the kinds of workmen employed. The workman who rents one of the little shops discussed above, will be interested, for instance, in the cost of power per kilowatt as measured by his meter, and will not be interested in the average cost of repairs to the entire factory of which the power plant forms a part.

An analysis of all labor expended in a given time arranged according to the kinds of labor employed does not, in general, give as intelligent a view of what has transpired as an analysis arranged to show the results of the several activities or functions of the business. There does not seem to be any reason why the manufacturer should not know the unit cost of his power, no matter whether he buys it or produces it himself.

It will be seen, therefore, that the general idea of classifying and distributing the expense according to

the functions or activities of the business is decidedly different from that which lumps all expenses together and distributes them uniformly over the entire product. The first classifies all expenses that apply to each activity or service of the business in such a way that this service and its efficiency or inefficiency stand clearly revealed. The second and older method throws into one lump all expense of a given kind without regard to the service rendered and at best gives nothing more than comparative totals which may or may not be useful. This may be made clearer by considering the problem a little more concretely.

125. *Production factors.*—In discussing the concrete case of an actual factory Mr. Church classifies the production factors or services rendered to production centers as follows:

- a.* Land-building factor.
- b.* Power factor.
- c.* Lighting factor.
- d.* Heating factor.
- e.* Organization factor.
- f.* Supervision factor.
- g.* Stores-transportation factor.

These are general factors that serve production centers in varying amounts according to their needs and are, in general, the most difficult to allocate. In addition, each center will have certain expense factors which are peculiar to itself, and which arise out of the character of the production center and the work therein performed. These include such items as interest, depreciation, repairs and supplies and all other expenses that obviously are entirely of a local character and which belong strictly to the production center concerned and have no relation to any other machine or process. It remains to consider the practical distribution of these several factors to the various centers. A full discussion of this feature of the plan is beyond the scope of this

treatise and only enough will be said to show the general principles involved and the difficulties to be encountered.

The first step in arranging this system is to lay off the factory into production centers. These centers may include no tools or they may include only one tool, as in the case of the large machines, or they may contain several, as in cases where a number of tools exactly alike are grouped together. The entire factory must be mapped out in this manner so that all equipment is accounted for.

126. *Land-building factor.*—The first factor to be considered would probably be the land-building factor and the first item under this heading would naturally be the interest or rental of the ground on which the building stands. To this would be added the interest or rental on the building and the taxes, insurance, repairs and depreciation on the same. The total of these charges divided by the total productive floor area would give the charge per unit of floor area which must be made against each production center.

In making such computations it may be necessary to take into account the use to which different floor areas are put. Thus, space in a high building used for erection purposes and served by an overhead traveling crane will be more valuable than the floor space of an adjoining building where three or four floors are used. This difference can be compensated for by charging a higher rate for the floor space in the high-roofed shop in computing the unit space charge as outlined above, also in computing the total space charge for the high-roofed shop.

In some cases the buildings cover only a small part of the land, the remainder being used for storage or other useful purposes directly connected with the business, or

part of it may be used in an ornamental way for lawns and parks. Again, the ground may be held under different conditions. Part may be owned outright, part may be mortgaged or part may be leased. Obviously no definite rule can be laid down that will cover all cases and each must be handled according to the conditions existing. In all cases, however, the land-building factor may be measured in terms of floor-area.

127. *Power.*—The distribution of the cost of the power used may be very simple or it may be complex. If electric power is purchased and each machine has its own meter it would not be difficult to apportion the power cost with accuracy. But in the average factory such simple conditions seldom exist. The same set of boilers may furnish steam for operating engines which supply power to the factory, to hydraulic pumps which supply an hydraulic system and also to air compressors which supply a pneumatic system.

The transmission system may be complex and it may be difficult to separate its services by departments unless the system has been constructed with this end in view. In addition, large amounts of power may be used in testing new product, as in the case in factories making electrical machinery.

But even in complex cases a division of the total power supplied can be made in a satisfactory manner, though it may not be absolutely accurate. Obviously, in very complex cases some estimating must be done. The total output of power of any one kind can then be debited to the several centers using it in proportion to the capacity of the motor or belt which operates it.

As before explained, an estimate must be made of the time each center will be in actual operation. The product of this estimated time and the horse-power as-

signed to each center give the horse-power hours which each center is expected to use. The total horse-power hours developed divided into the total cost of the power will give the rate per horse-power hour that must be used in distributing the power expense. The total cost of any one kind of power must, of course, include interest on that part of the power plant which supplies it, depreciation, repairs, fuel, etc.

128. *Lighting factor.*—The general method of apportioning the lighting expense would be similar to that pursued for the problem of power in so far as allocating the total cost to any one building is concerned. The total amount assigned to any building divided by the total floor area, as in the case of the building factor, will give the charge per unit of floor area which may be used in the machine rates in proportion to the space used by the center. Due care must, of course, be taken that interest, repairs, depreciation, etc., over the entire lighting equipment are equitably distributed to each building as far as possible as well as the actual cost of the gas or electricity supplied.

129. *Heating factor.*—The problem of heating and ventilating is very similar to that of lighting, the cost being reduced to a charge per unit of floor area. These items, in common with lighting, are not constant the year around. Thus heating may only be required during a few months of the year. It would not be good policy, however, to charge off these heavy expenses during the months they are incurred. The total cost of heating and ventilating the factory is, therefore, spread out over the entire year, lighting being treated in a similar manner.

It would appear, therefore, that even in this method of distributing expense some averaging must be re-

sorted to, and exact distribution in point of time would not be desirable. It should be noted, however, that this averaging is within the service itself. It simply equalizes the service charge over a period of time, differing in this respect from the old averaging methods which average all services over all activities regardless of the use each activity has made of such services.

130. *Organization factor.*—Under the term organization factor, Mr. Church includes such elements as the building factor of offices, cost of time and cost-keeping, factory office expenses, wages of watchmen, interest, depreciation and repairs on office furniture and fixtures. There is no difficulty in obtaining the yearly and monthly totals of these items, and it remains to assign this total by machine rate.

In a very large works which is highly departmentized this total could be apportioned to the several departments with a fair degree of accuracy; but after such an apportionment is made, or in the case of a small factory, further allocation based on services rendered would be difficult. It is sufficiently accurate, however, to distribute these departmental totals over the production centers involved by simple division. The cost of this class of service is not, in general, affected by the size or weight of the parts handled. It costs as much to put in a production order for a small part as it does for a large part. This method will, therefore, be substantially correct. The dividend obtained by dividing the total organization expense by the number of production centers involved will give the factor which may be included in the machine rate to cover these expenses.

131. *Management and supervision factor.*—The management and supervision factor will include the wages of superintendents and foremen, cost of inspection, the

building factor of such offices as pertain to supervision and the interest, depreciation and repairs incident to the equipment involved. Brief reflection will show that there is no fixed or best way for allocating this expense, and the method used must vary with the circumstances. In other words, the element of judgment must enter into the distribution of this factor. Many of the items of this factor can be localized without trouble and when this is accomplished the remainder should be distributed by judgment after a careful survey has been made of the relative value of the services rendered.

132. *Stores and transportation factor.*—The last factor, stores and transportation, is by far the most difficult to apportion. This factor will include the cost of storing, handling, and transporting material during manufacture. It will not include freight and cartage of finished product or such items as the handling of coal and ashes, which belong in the power-house accounts.

Mr. Church has pointed out that the storing of materials, moving them from stores to shops and from machine to machine constitutes a separate and distinct service that should be accounted for separately and charged for in proportion to services rendered. It is true, also, that the efficiency of the factory is measured largely by the efficiency of the system of stores and transportation, hence comparative costs on this class of service would be valuable aside from their use in cost finding. Mr. Church has also noted that this factor is divisible into two parts—the cost of storing materials and the cost of moving materials. It should also be noted that the allocation of this item cannot be made on the basis of the value of the materials handled unless the material is all of one kind. It costs no more to handle brass castings than it does to handle wooden

articles. Bulk or weight must be the basis for such allotment.

Furthermore, brief reflection will show that there is no fixed rule or method by which this apportioning can accurately be accomplished, and the element of judgment must play a large part in such matters. In a shop doing mixed work in an intermittent manner very accurate allocation of this item is impossible.

In this item, however, the cost of the general stores can be allocated by judgment to departments, the cost of the transportation service can be localized as far as possible and the items of general utility also apportioned as good judgment may dictate. Even such a disposition of these expenses will be fairer than that obtained by the averaging method which taxes all activities equally. When the totals have been allocated to each center the amount chargeable against each can be reduced to an hourly rate and included in the machine rate as before.

133. *Individual factors.*—In addition to the general factors that have been discussed there will be, as has been noted, certain expenses that are connected directly with each production center itself, and which have no connection whatever with other centers. Thus, interest on the value of the machinery, repairs, depreciation, and insurance, and such supplies as may be necessary for its operation, may be mentioned as examples of these individual factors. In some cases the cost of tools or attachments might be included in this charge. Obviously the totals of these items can be reduced to an hourly charge which can be included in the machine rate. The relation between depreciation and repairs requires no further discussion except to point out that a careful distinction should be made between repairs

that add to the producing value of the centers and those that simply replace wear and tear.

134. *Controlling accounts.*—It will be evident that some means must be provided for insuring that the total cost of each service is properly distributed as the expenses rise and fall and that the supplementary rate absorbs the residue. In all averaging methods the same care must be exercised with regard to the totals of all expenses. To accomplish this, Mr. Church advocates the use of control accounts, an account being kept for each factor. All accruing expenses of a given kind are carried to the corresponding control account and placed on the debit side. All expenses distributed are placed on the credit side. The difference, if any, indicates the change which must be made in the machine rate to equalize the difference. These control accounts can obviously be used with advantage for equalizing heavy expenses over periods of time. A full discussion of these interesting accounts is beyond this present work.

135. *Assembling of production factors.*—The foregoing very brief discussion of production factors is based largely on Mr. Church's reasoning and is introduced more particularly to show the character and difficulty of the problem than to offer specific methods of solution, which are beyond the scope of this treatise. It may be well, however, to note some methods for collecting these factors into concise and useable form. Obviously the problem is complex and should be undertaken systematically. Figure 17¹ shows a form suggested by Mr. Church and arranged for the convenient collection of these items. A schedule like this may be provided for each shop or department, and there should

¹ See "Production Factors," by A. Hamilton Church, p. 126.

be a vertical column for every production center in the shop. The total hourly rate then may be found for each center by dividing the total of all charges by the total hours of operation as indicated.

SCHEDULE OF _____				SHOP FACTORS			
AND MACHINE RATES							
1	DESCRIPTION						SHOP
2	MACHINE NO.						TOTALS PER
							ANNUM
3	SPACE OCCUPIED						
4	POWER ABSORBED						
5	CAPITAL VALUE						
6	DEPRECIATION RATE						
7	BUILDING FACTOR						
8	POWER FACTOR						
9	LIGHTING FACTOR						
10	HEATING FACTOR						
11	STORES-TRANSPORT FACTOR						
12	SUPERVISION FACTOR						
13	ORGANIZATION FACTOR						
14	INTEREST, DEPC'N & INSR'CE						
15	REPAIRS & MAINTENANCE						
16	OIL AND ALLOWANCE						
17	TOOL ROOM CHARGE						
18	YEARLY TOTAL FOR 2700 HRS.						
19	HOURLY RATE						

FIGURE 17—SCHEDULE FOR DISTRIBUTING EXPENSE ACCORDING TO PRODUCTION FACTORS

This form, while comprehensive so far as the detail into which the production factor idea is carried, is arranged for recording the final values only and does not assist materially in actually computing these values. An examination of Figure 18 may be of service, there-

fore, in applying the foregoing methods. Figure 18 shows a hypothetical analysis of this problem, made by Mr. Sterling Bunnell¹ and reproduced from his work on "Cost Keeping," with minor changes to make its discussion clearer. The example taken is based on a small shop with one high story housing the larger tools, and an adjoining two-story building housing the smaller tools. The high story is equipped with a traveling crane. Mr. Bunnell illustrates several good approximations and other means by which the detail of the method may be shortened without materially affecting its accuracy. A brief study of this tabulated statement will make the possibilities of the method more real.

In the table, the first column, reading from the left, contains the number of the production center. This number may be attached to the production unit in any convenient manner that will make identification sure and easy. The second column contains the name and size of the unit. The third and fourth columns contain the single story and two-story floor space allocated to each production center. The fifth column gives the value of the equipment in each center. The sixth column gives the estimated life of the asset taking obsolescence into account. Column seven gives the estimated average horse-power required to operate the unit, while column eight gives the estimated number of hours the machine or production center will be in use during the month. These latter values must, of course, be established by estimate unless means are provided for measuring the power consumed over a considerable period of time, but if estimated their total should check with the total power developed. Column nine gives the horse-

¹ See "Production Factors," by A. Hamilton Church, p. 128. See "Cost Keeping," by Sterling Bunnell, p. 152.

power hours used by each unit and is found by multiplying together the corresponding values of columns seven and eight. Column ten contains the charges for interest, depreciation, and insurance. In Mr. Bunnell's original example, depreciation only is given in this column, interest and insurance apparently not being included in the analysis. From the foregoing discussion, however, it will appear that these and similar items should be included in exactly the same manner as depreciation. The values given in column nine are those listed by Mr. Bunnell for depreciation alone and would, therefore, be too small if interest, insurance, taxes, etc., were included. They will serve, however, to illustrate the principle.

The unit space charge, column eleven, is found by dividing the interest or rent on the building and ground (in this case taken at 10 per cent on \$18,000, or a total monthly charge of \$150) by the total area, after doubling the area of the high-story building. This gives one and one-tenth cents per month per square foot of space for the low-storied floors and two and two-tenths for the high story. Multiplying the areas in columns two and three by the proper respective rate gives the values shown in column eleven.

Power, heat and light, column twelve, are all considered together and this seems logical for a small shop. The total expense of these items, including space charge, depreciation, etc., divided by the total horsepower-hours developed (see bottom of columns nine and twelve), gives the cost per horsepower-hour as three cents, nearly, and multiplying the items in column nine by this rate gives the amounts listed in column twelve.

Columns thirteen, fourteen and fifteen list the respective items of repairs to machinery, repairs to small

tools and general labor and supplies that are chargeable against each center. These items can be allocated by judgment until such time as accurate records can be obtained, care being taken that the total of each kind of expense is covered by the allotment. In small shops these items can, no doubt, be apportioned accurately enough by judgment.

The totals of the items in columns ten, eleven, twelve, thirteen, fourteen and fifteen opposite each unit are then totaled and carried to column sixteen. These totals in column sixteen represent the monthly cost of operating each unit. Dividing corresponding items by the estimated number of hours of operation gives the hourly rates listed in column seventeen. All remaining items of expense not provided for are converted into a monthly total and divided by the total hours worked by all productive units giving a rate of three cents per hour for every production hour as indicated in column eighteen. This supplementary amount added to the corresponding items in column seventeen gives the total burden rate which should be charged for the use of each productive unit.

Obviously these rates are only approximately accurate. It will be logical and much more convenient, therefore, to express them in even figures. Furthermore, it will be more convenient if all rates which are nearly alike are grouped together and an average rate taken for the group, thus reducing the number of rates. This has been done in the above example and column nineteen gives the final readjusted rates. It will be noted that some of the smaller rates have been increased to make them carry a little more of the burden and all rates have been rounded off so as to make computations simpler and also so as to make as few groups of

rates as possible. If it is desired these groups may be designated by letters and each unit can be given the letter corresponding to the group in which its rate is found. The time cards sent in from each center may then bear the letter identifying the rate assigned to it, thus facilitating the computation of the expense chargeable against each job. The operation of the plan then becomes identical with the operation of any machine rate with the supplementary rate, but obviously the results produced are much more intelligent. This illustration, while it does not possess the refinements of the complete plan as outlined by Mr. Church, is very useful in showing how the method may be modified to suit small shops or other plants where a compromise must be made. With all the modifications and approximations suggested it is evident that costs obtained by this method will be much more equitable than by the averaging methods.

186. *Defects and objections to production factors and supplementary rate.*—The manifest advantages of this method are offset, to some extent, by the great amount of preliminary work and study necessary to install the method in plants of large size or complex character. If the plant is built and laid out with the cost-finding problem in mind, this work would be greatly lessened, and there is no doubt that this feature of factory management will influence, in no small degree, the construction and arrangement of future industrial plants where many and varied products are to be made. The application to complex existing plants is, as before noted, difficult and can be accomplished only by a liberal use of good judgment. Nevertheless, as has been pointed out, even these difficulties are not inseparable in most cases.

Moreover, in comparing the accuracy of the distribution of expense by this method with that of the averaging methods it should be noted that some of the production factors of the new method are themselves based on averages. Thus, buildings are not heated and lighted equally all the year round, repairs on all kinds of apparatus are not proportional to elapsed time, and expense material may be bought one day that may not be used for several months. These variable factors of expense must be spread out over more or less arbitrary periods of time, if costs are to be consistent. Again, the expenses that have been incurred during the time a job has been in construction are not always definitely known. If all jobs could be started on the first day of the month and shipped on the last day it might be possible to allocate with some degree of accuracy the identical expense incurred by each job. Evidently such conditions seldom or never exist. Work must be started whenever necessary and shipped and billed as soon as possible and both production factors and supplementary rates must, in general, be based on previous performances. Usually the record of the previous month is used for rate setting but, as has been noted, some expenses may have to be distributed over longer periods to prevent costs from being erratic. Any claims for great accuracy in any method of distributing expense should be discounted liberally, unless the conditions are so simple that the interpretation of all the factors involved can clearly be seen.

An objection often urged against machine rates, in general, is the penalizing effect on small work which is done on a large machine. It often occurs, especially when work is scarce, that work is done on a machine considerably larger than is actually required for the

process. Under the machine-rate method of distributing expense the job so done receives a much larger share of expense than if done on a tool exactly suited to the operation, thus penalizing the job heavier perhaps than the market price can bear. Furthermore, most records so made are misleading, if not properly interpreted, and if used for future estimates are likely to make the quotations too high.

While all this is true, the fact remains that the costs so obtained are closer to the truth than those obtained by averaging methods which make no distinction between the size and cost of the equipment employed. The machine rate is in this respect an index of the efficiency of operation and may serve to call the attention of the manager either to a weakness in his manufacturing equipment or to the pressing need of more work of certain kinds. This may be particularly true in dull times; for in such times the large machines and processes which normally distribute a large part of the expense because of their higher machine rates are usually the first to become idle, as business falls off, and the last to resume operations as business revives.

CHAPTER XI

DISTRIBUTION OF GENERAL EXPENSE

187. *Distribution of administrative expense.*—Administrative expense and selling expense in most factories, and particularly in small factories, are treated as one item under the name of general expense and are usually distributed as a percentage on factory cost. In many such cases it is not possible to make a clear cut division between these two classes of expense, but wherever possible they should be treated independently, if for no other reason than to fix responsibility. In large enterprises it is usually possible to segregate them, since the sales organization of a large works is usually an independent one; but even here there may be items of general superintendence that should be divided between the two branches of general expense.

It is difficult to distribute administrative expense over factory product in proportion to services rendered, by any method of allocation. Where the factory is very large and very closely departmentized, each department having its own office force, an approach to intelligent allocation can be made, but the average factory is not so arranged. The usual method is, therefore, to distribute the administrative expense as a percentage on factory cost.

Thus if the factory output for any month is \$50,000 and the administrative expense for that period is \$10,000, the percentage by which the factory cost of each article must be increased in order to absorb the

administrative expense will be $\frac{\$10,000}{\$50,000} = 20$ per cent.

If, then, the shop cost of a given machine is \$200, its cost, including administrative expense, will be \$200 + \$40 = \$240. The factory cost plus the administrative cost is sometimes called the gross cost.

138. *Selling expense.*—Selling expense is even more difficult to distribute over the product in proportion to services rendered. In the first place, selling has no connection with manufacturing. The factory may be in the country and the sales office may be, and often is, in the city. There is no relation between the two branches and hence there can be no relation between individual items of selling expense and factory orders. Occasionally, of course, a salesman may do work on securing an order for a particular machine and may be successful. On the other hand, he may fail to secure it and an order for it may come in unsolicited from some other quarter. Much of the work of the salesman is “missionary” or advertising work, and it is difficult, often, to trace and identify the results of his efforts.

Where the enterprise is very large, and the sales force is departmentized, according to the several lines of product the cost of selling the several lines may be intelligently allocated against each line. But here, again, there is seldom any connection between the cost of selling an article in any given line and the cost of producing it, the latter being fixed by conditions entirely aside from the cost of selling. The best that can be done, therefore, is to distribute the selling cost as a percentage as in the case of the administrative expense.

The computation is simplified, of course, if both administrative and selling expenses are lumped together and so distributed, and this procedure is customary in

most plants. It should be noted, however, that there is no reason why the details of such expenses should not be carefully segregated so that the manager can see not only the separated totals of administrative and selling expense, but also the important details of these expenditures. Some suggested details of these expenditures are given in Section 86, but, evidently, the extent to which such detail may be logically carried will depend on the size and character of the enterprise.

139. *Résumé of methods of distributing expense.*—

The foregoing discussion of the several methods of distributing expense and the discussion in Chapter X regarding the character of its several items will have made it clear that exact allocation of factory burden is not, in general, possible. It is true that in very simple cases, such as are found in the continuous industries, the distribution may be as accurate as is desired, but the general case of intermittent manufacturing does not admit of an exact solution. Even though clerical machinery be installed which, theoretically, will give accurate results, the expense items themselves are so variable as to make exact distribution difficult even in simple cases and impossible where the conditions are complex. This fact is made clear when it is considered that the exact expense to be distributed is itself not always accurately known; distribution must be based on records of the past week, month, or year, as the case may be. In most cases the record of the previous month is used as a basis, but it may be that in some cases it will be better to base the distribution on the average of a number of preceding months. In all cases heavy periodic expense investments should be spread out so as to equalize the costs.

The fact that there are so many methods and theories

of distributing expense is perhaps due to some extent to the fact that there is no absolutely accurate method. The need of some theory on which to build a system of expense distribution is self-evident, but the theory adopted should be capable of practical application. The method that will be satisfactory in one case may not do at all in another. There are, however, two fundamental principles that should be remembered no matter what system of distribution is being considered.

First, the cost records obtained should state, so far as possible, the facts of the case; they should be records of events that have happened and of nothing else. A clear cut distinction should be made between costs as such and their interpretation and use which is another matter. Systems of costs based on estimates are in common use. Obviously such methods cannot be considered seriously either for accuracy or as a guide for future action. But, although the primary object of a cost system is to state facts, due consideration should be given to the use to which these facts are to be put. In general, the two main uses of costs are, first, to show how money has been expended and, second, to indicate how such expenditures may be controlled. In organizing a cost-finding system, therefore, the form in which cost returns are recorded should be carefully considered so as to render classification and analysis easy and simple. A later chapter will treat this matter more fully.

Second, the system adopted should be as simple as possible consistent with the problem in hand. The average manager is a very busy person, usually demanding methods that are simple and easily followed and, ordinarily, being suspicious of methods he cannot understand, or results the derivation of which he cannot easily

see. Furthermore, the system should be stable and not subject to constant readjustment because of slight changes in operating conditions, since readjustment usually destroys comparison with costs already existing.

For these and many similar reasons the cost system adopted is usually a compromise which takes into account the surrounding conditions. Thus it would be a useless expense to install an elaborate machine rate and supplementary rate in a continuous process industry where a single product is being produced and where a simple percentage-on-material method would be accurate enough. Again, in an industry making a few lines of goods of similar characteristics, where the parts do not vary much in size, and where the machines are all small and of low value, a percentage-on-wages or the hourly-burden method might give results sufficiently close. In more complex cases, as in intermittent manufacturing, where many commodities of varying size and character are made, it has been shown that these simpler methods do not give intelligent results. If the competition is keen the wise manager will go as far as he can in the direction of the machine rate and the supplementary rate. Even in some such cases conditions may be such as to permit the use of simpler methods, particularly if careful departmentization can be effected. The general influence of departmentization on costs should not be lost sight of since by this means all cost-finding methods are strengthened, as has been noted in discussing the several methods of distribution. A later section will discuss this important factor somewhat more fully.

Above all the manager himself should have a clear cut view of just what he wishes to do. In general the practical manager must have the help of an expert organizer to assist him in installing a new system, but, he

himself should be able to intelligently limit the extent to which the system is carried. It is one thing to lay down general principles and another to know how far they can economically be carried. One of the most common errors of cost-finding experts, who are lacking in practical experience, is to over-systematize in installing new cost-finding systems, with the result that much useless information is gathered and eventually much of the elaborate system is discarded. The cost-finding expert should be a master of the principles of his business, the practical manager should supply the limitations. And finally, it is of supreme importance that some system, be it ever so simple, shall be in service. A factory without a cost-finding system is like a ship without a rudder, and in these days of strenuous competition is sure to go on the rocks of failure.

140. *Departmentization.*—The advantages of departmentization with reference to cost-finding has been referred to several times in the preceding discussion and it may be helpful to note several other aspects of this feature of factory organization. From the preceding discussion it will be evident that cost-finding is closely connected with factory management. In times past, however, little or no attention has been paid to the problem of cost-finding, either in arranging the plant or in organizing the personnel thereof. It will appear, however, that it should at least be kept in mind in perfecting both plant arrangement and organization.

If a manufacturer were to engage in producing two widely different commodities in two factories placed side by side he would, naturally, organize all "services" for each shop separately, distinct from similar services in the other. He would wish to keep his bills for power, heat and light separate for the two shops and would ar-

range his transmission machinery accordingly. The book-keeping system of the two shops would be independent of each other and all cost factors would be strictly allocated to the factory to which it belonged. He would expect to be able to keep the records of his two activities entirely independent of each other.

On the other hand he may, and often does, attempt to manufacture articles of widely different characteristics in the same factory without any thought of arranging either his plant or men to assist, as far as possible, in separating the manufacturing costs of the several items. Yet a careful consideration of the cost-finding problem would lead to radically different methods of distributing heat, light and power and similar services and careful departmentization, with the cost problem in mind, would often simplify this same problem.

The foregoing discussion will have made it clear that the problem of distributing factory expense in any department approaches simple division of such expense as the tools employed become more equal in size and value, as the wages paid approach equality and as the work performed becomes more and more uniform in size and character. The problem of distributing the expense over a department containing twenty-five lathes of the same size and value operating on exactly the same part and operated by men of equal wage value and productive capacity is extremely simple since such a group can be considered as a large production center and it is comparatively easy to allocate the expenses to it in bulk, and simple division of this bulk is about all that is necessary, if at all necessary. On the other hand, the problem has been shown to become increasingly complex as the component factors named vary increasingly in size, character and value.

141. *Division according to finished product.*—Now there are two distinct methods or principles for grouping machines and processes. These affect very greatly not only the physical arrangement of the plant, but also its personal administration, and the ease and accuracy with which expense may be distributed. The first method is to group the machines or processes on the basis of the character of the finished product. Thus in a large machine tool works organized in this manner one department would be equipped with a complete set of machines and tools for building lathes, another would be similarly fitted out to build milling machines and another would have all the necessary appliances to build drill-presses and so on, each department being equipped entirely independent of the other and self sufficient for the purpose for which it has been organized.

142. *Division according to processes.*—The other method of organization is to group all machines and processes according to the process to be performed. Under this method all machines of approximate size and character are grouped together. Thus in the example taken above all the turning would be done in one department, all milling in another, all planing in another and all assembling in another. In each of these departments, in turn, all machines and processes of all similar kind and size would be grouped together. Thus all small lathes engaged in manufacture would be in one group, all large lathes in another, and so on. Even in the assembly of the completed product, while all assembly might be in one department, each class of product would be assembled by itself. In other words, in this method all similar production centers would, as far as possible, be grouped so as to form a large production center the component parts of which do not vary greatly.

The first method is a natural outgrowth of the small shop where the number of tools of any one kind was limited. As new lines of production were added their processes grew up around the personality of some strong executive or manufacturing superintendent who often did not want to assume the responsibility of production and delivery unless he had full control of the major part of the productive machinery required. Many such strong personalities also were impatient of the restraint imposed by the necessity of close co-operation between departments and the result of their influence was much duplication of tools and processes.

Modern organization, however, moves along different lines. It tends to substitute staff organization for individual effort, to replace the versatile individual with co-ordinated specialization and to arrange machines by processes rather than by products. It is evident that this modern method is by far the most economical and fewer tools of any given kind will be needed since the possibility of keeping all machines in operation is much greater when all tools of one kind and the work which can be done upon them are collected in one place. The indirect expense for superintendence will be less and the volume of the product will be greater since specialization can be made more effective.

Both principles should be given careful attention in arranging the plant, especially if cost-finding is being considered. In a very large works, for instance, the entire plant may be arranged by products, certain definite buildings being devoted to definite lines of work so that the total costs of each line are easily segregated. The tools and processes used in each line of work may, however, be arranged to best advantage by the other method; that is by the processes performed. Careful consider-

ation of the arrangement may make it possible to use a simple cost-finding system, whereas lack of such consideration may make the problem so complex as to be beyond even the most elaborate method. It should, of course, be noted that strict adherence to either principle is not always possible or necessary. Many departments are equipped primarily to perform a given process often requiring a few tools of an entirely different character simply to save time and transportation. Space does not permit further discussion of this problem, but it is evident that it is one deserving the careful attention of the manager who is interested in costs.

CHAPTER XII

ASSEMBLING AND RECORDING COSTS

143. *Uses of costs.*—It will be evident that the manner in which costs are recorded and the detail with which the recording is carried out will vary greatly with the enterprise, and the point of view of the manager. In some simple continuous processes lump sums only may be required while in intermittent production involving many kinds and many sizes of parts the detail in which costs are collected and recorded may be very great. The detail of cost accounting will also vary tremendously with the purposes for which it is desired to use the collected costs data. These uses may be several, but in general they may be summed up under three heads:

- (a) To show the actual cost of operations or performances.
- (b) To serve as a basis of predicting future performances.
- (c) To form the basis of managerial and other reports.

The first purpose, is, of course, the fundamental reason for keeping costs. In so far as total profits are concerned there is no necessity, as will be shown, for a cost keeping system. But it is essential in most industrial enterprises to know, as closely as possible, the cost of producing each individual article, sometimes even of each part, if for no other reason than to know what lines are paying and what are not. It should be fully realized, that factory costs are not always serviceable in fixing

selling prices. In many instances the selling price must be fixed by the prevailing market price and this may have little relation to the cost of manufacture. Such circumstances are especially likely to prevail in lines of work where cost-finding methods are, in general, crude and poorly understood. Yet this is all the greater reason why, in such cases, costs should be known as accurately as possible. A knowledge of the details of the cost of producing any article is a good start toward reducing its cost. A knowledge of the actual facts concerning the cost of production of each article, as far as it is economical to obtain them, would seem to be a common sense requirement for a continuation of any enterprise. There is no doubt but that it is a lack of this fundamental knowledge that carries many enterprises "to the wall." The detail methods of recording cost data will be fully discussed in a later section.

144. *Recording costs only part of function.*—As already noted in Section 8 a cost-finding system that is used only for recording costs has fulfilled only a part of its true purpose. Too many managers think of costs simply as records of performance whose usefulness is ended once the goods are billed. Now the most significant movement in modern manufacturing is the tendency to predict all manufacturing performances. The engineering and designing departments long ago began the prediction of the constructive features of manufactured products. The form and dimensions of all manner of articles and even the tools for producing them are predicted, as well as the practical and theoretical performance of the completed product. Careful managers have for many years endeavored to foretell the times and costs of productive operations with the same degree of certainty that has been attained by the engineer and de-

signer. One of the cardinal principles of so-called "scientific management" is the possession of advance knowledge of the time and cost of each operation in detail, leaving nothing to chance or judgment. And just as collected scientific knowledge forms the background of engineering production so collected cost data, including the two important factors of time and wages, form the basis of all predictions of productive performance. So-called time and motion study stands in the same relation to cost prediction as engineering research stands to engineering design. Any system of recording costs, to be most effective, must be arranged with this feature of management in view.

145. *Distinction between actual and estimated costs.*—A careful distinction should be made, however, between actual costs and estimated costs. Cost estimates made in advance may be successfully met in actual productive performances; but it should be remembered that actual costs must always be based on actual performance and before estimated costs are used in any way they should be carefully compared with actual results. Some of the cost systems in common use, based on estimates only and unchecked by actual records of results, can be considered as little better than guesswork.

146. *Value of expenditure reports.*—In addition to the two preceding functions of cost records they should also show the distribution of expenditures. The total expenditures while showing the manager the probability of gain or loss do not tell him much regarding the ways in which money has been spent or indicate to him where he must insist upon retrenchment and improvement. He cannot find this information by a personal inspection of the details of the cost records except as they apply to specific parts. If, however, the cost data are

carefully classified and gathered up into reports a very clear idea of the most important tendencies in the business can be secured by the manager. Classification and summarizing of cost data according to the character of the expenditures is hence an important feature of cost recording and must be kept in mind in organizing the clerical machinery of the department. This feature of management will be more fully discussed in a later section.

147. *Production orders.*—The detail necessary in recording costs of production will vary with the relative amount of consideration given to the three general uses of cost data which have just been discussed, and also with the amount of detail involved in the job concerned and the character of the processes used in doing the work. Obviously no one system is applicable to all cases, but there are a few general principles in common use which may be helpful. Referring to the last item, the character of the processes used, it is clear that the methods used in summarizing costs for a continuous process factory or one using processes in such a manner that it is difficult to tell where one job stops and another begins will be somewhat different from one using the production order method by which each job is kept distinct from all others. The discussion will, for the present, be confined to the production order method and the process method will be considered later.

It will be remembered that in the production order method all time expended is recorded originally on some form of work card (Figures 12, 13 and 14) which identifies the work performed with the shop order number, the part or drawing number, the time expended, and the workman who does the work. All material used will be reported from the store room by means of the requisi-

tion on which the material has been issued. Sundry expenditures that are neither labor or material which are chargeable against specific jobs will appear on properly approved vouchers. The indirect charges will be reported in exactly the same manner as direct labor and material so as to be charged against the proper standing expense order numbers to permit of their total amount for any given period being ascertained.

148. *Cost ledgers.*—Now if the work is of such a character that each shop order involves only a few charges for material and labor it is obvious that such charges, with the correct expense charge belonging thereto, could be carried directly to the general ledger account of the order concerned, and with any other charges properly relating thereto the entire transaction could be recorded in one small ledger account. On the other hand, if the job involves many operations and its construction is to extend over a considerable period of time such procedure would make the general ledger too bulky and would tend to obscure its true object as a summary of the business. For this reason costs of a complex character are usually collected by some form of cost-ledger, the function of which is to permanently record the details of items entering into the cost of production. The summaries only of the cost-ledger are carried to the corresponding accounts in the general ledger.

Cost ledgers like all other subsidiary ledgers, such as the stores ledger and stock ledgers are most conveniently made up as a card system. The forms of ruling for such cards must, of course, coincide with the requirements of business. If the number of entries for each job is not too great, a single card may suffice to carry the record of all the details of its production. A cost-ledger sheet

of this character is shown in Figure 19. It will be noted that provision is made for recording the cost in considerable detail under the three principal factors, material, labor and expense. The several operations performed upon the piece are noted with the workman's number and his rate. The total cost is usually also noted upon the card by adding the general expense to the total factory cost as recorded.

It may be more instructive, however, to describe a typical method of recording costs where the details are beyond the capacity of a single card. It will be understood that the procedure described is a typical one only and simply suggestive of the general methods in common use. The discussion will be confined for the present to the problem of finding total costs, the first of the general uses for costs which have already been stated.

149. *Labor and material cards.*—When a production order is placed in the shop an account is opened in the cost ledger by placing in its files the necessary cards properly filled out. These will consist generally of a labor-cost card and a material-summary card. The work cards (Figures 12, 13 or 14) are collected daily and, after being approved by the proper foreman, forwarded to the cost-department. Here they are first sorted according to workmen's numbers, that is, all the cards sent in by any one workman are grouped together. It will be noted that each workman will send in, daily, a separate work card recording the time he has worked on each and every job whether he finishes these jobs or not. The wages represented by each card are now computed and noted thereon. This may be based upon day pay, piece-work or premium-plan methods, but in every case the wage so recorded is the labor cost chargeable against the job so far as that particular work card

is concerned. If the expense is distributed by machine rate or if different percentage rates are used for different departments of the factory, expense belonging to each work card should also be computed at this time and noted upon the card. If a fixed percentage is used for all work alike it is generally more convenient to defer the computation of the burden until later.

The total time recorded by each man can then be checked against the time-clock or check-board record to insure that all elapsed time recorded by these records is accounted for. The daily pay-roll may now be made out. If all men are on day pay an independent pay-roll may be made out based upon the clock or check-board record and this must check against the costs as shown by the work cards. If, however, piece rates or a bonus system be in use the pay-roll must be based upon the work cards, though, even then, the elapsed time must check against the clock record.

150. *Labor cost sheet.*—The work cards are then sorted by production orders, that is, all cards bearing the same production order number are brought together. The items referring to each production order are then posted on a labor cost sheet as shown in Figure 20, a separate sheet being made out for each production order so that the total labor cost of the order concerned can be summarized at any time. In cases where the labor charges are few, they could, of course, be posted directly to a cost summary card such as is illustrated in Figure 19. The detail in which the labor-cost may be recorded on the labor-cost card must, of course, alter with conditions. It may be a simple running memorandum, a summary of which will give only the total labor cost of all operations or it may be arranged so as to give the total labor cost by operations as illustrated in Fig-

ure 20, where similar operations may be totaled. The amount of each work card may be recorded or the cards may be recorded in groups as conditions dictate. In so far as securing total labor costs is concerned the work cards are no longer necessary after they are posted on the labor sheet. Their further use in securing statistical costs will be discussed in a later section.

151. *Material cost sheet.*—The material requisitions after being properly evaluated either by the storekeeper or in the cost department may, if their number be small, be filed with the labor-cost sheet. If, however, there are many material entries they may be posted on a material-cost sheet in the same way that labor charges are carried on the labor-cost sheet. For the ascertainment of total charges the material requisitions have then fulfilled their service, but like the work cards they are still useful for statistical purposes.

The costs of indirect labor and material are gathered in the same manner as the direct costs, the detail costs, as they come in on work cards and the material requisitions being carried to the proper expense account. The total of these expense accounts must be compared periodically with those of preceding periods to insure that the factors used in their distribution are accurate.

152. *Cost summary sheet.*—From the labor cost sheet and the material cost sheet the total prime cost to date may be summarized at any time. When the job in question is finished, the summaries of both of these sheets are carried to a cost summary sheet. If only one article is involved and all labor and material items are carried to a cost ledger card as shown in Figure 19 the summary may be made directly upon it. To the prime cost so summarized is added the expense, if it is distributed by a percentage method, or the proper proportion of the

supplementary expense is added if the machine rate method of distribution is in use. If there are any sundry charges that are chargeable directly to the production order as shop expense these are also added, thus completing the factory cost. To the factory cost is added the proper percentage for general expense and selling expense giving the total cost of the article.

153. *Grand cost summary.*—If any particular job consists of many parts and production orders have been issued for each part, so as to segregate its cost, a grand summary of all cost summary sheets for the entire job must be made as shown in Figure 21, which illustrates clearly the summarizing of the costs for a direct acting steam pump. The figures given are hypothetical and taken somewhat at random. The need of such methods will be made more apparent by considering, for example, the costs of a large multiple-cylinder marine engine where it is desired to obtain the individual costs of the several parts or group of parts which make up the engine. Or, again, if it is desired to obtain not only such individual costs but also the summarized costs of the propelling machinery such summaries are a necessity. In the example shown, Figure 21, the factory expense is computed separately as would be necessary if different percentages were used in different departments. The general and selling expense is also computed and added thus obtaining the total factory cost.

154. *Comparative records.*—It will be evident that the above methods are sufficient for the purpose of recording total costs. If, however, it is desired to use these recorded costs as a means of fixing piece rates or estimating on contracts it is very often desirable to express them comparatively since a single set of costs is not likely to be reliable as a guide to future work. If

COST SUMMARY SHEET

NAME 16 x 9 x 12 Deep Pump
 NUMBER MADE 1

SHEET NO. 642
 PRODUCTION NO. 2346

NUMBER	NAME OF PART	MATERIAL	LABOR	PRIME COST	EXPENSE	COST
2	Steam cylinders	35 45	50 20	65 65	40 16	125 81
2	Water cylinders	50 20	60 10	110 30	48 08	158 38
1	Frame	15 60	20 05	35 65	16 04	41 69
1	Steam piston	5 06	15 16	20 22	12 12	32 34
1	Water piston	7 08	14 64	21 72	11 71	33 43
1	Piston Rod	3 04	2 60	5 64	2 08	7 72
1 set	Valve gear	7 24	24 06	31 30	19 24	50 54
1	air chamber	6 80	2 46	9 26	1 96	11 22
	Assembling and testing		64 20	64 20	51 36	115 56
	Miscellaneous		6 24	6 24	4 99	11 23
	Factory Cost					587 92
	General expense 15%					88 18
	Selling expense 5%					29 39
	Total cost					705 49

FIGURE 21
400

costs are recorded by production order numbers as explained in the foregoing discussion, only the totals of the several items are quickly available.

In the case of the pump illustrated in Figure 21 the summary will have back of it a number of subsidiary summaries, each giving the total for one of the components of Figure 21. If these subsidiary summaries are filed under the controlling production order number it is obvious that more or less difficulty will be experienced in finding the comparative costs of a given piece as manufactured for different pumps of the same size and kind.

155. *Costs by classes.*—If on the other hand the cost of detail parts is recorded by classes and not by production order numbers this difficulty is obviated. This method is illustrated in Figure 22 where the details of making several lots of turret lock rings for turret lathes is thus recorded. The record given in Figure 22 is very complete, the work being recorded by classes and also by production orders. The letters *M*, *A* and *H* under each class of operation indicate whether the work has been done by a mechanic, apprentice or helper. The number of minutes expended on each operation for the lot is recorded and directly underneath is the cost per piece. On the right the totals of these items are summarized together with the total cost per piece in each lot. Records of this kind are very instructive in setting piece rates or comparing methods of production.

156. *Detail of costs.*—In the case of the construction of a single machine or a small number of machines, where a repetition of the order is not probable, it is sufficient to record the cost by production order number, filing the detail and summarized costs, that are retained, under a few order numbers. But in manufacturing a

standard product, which is in more or less continuous production, the method of filing by classes¹ is much more useful. Obviously many variations may be made in these methods and it should be remembered that the usefulness of the final cost record depends greatly upon the intelligence with which the production orders are issued. In one case it may be sufficient to group all costs under a single order number and summary. In another it may be necessary and sufficient to divide the job under a number of production orders and carry the summarized cost of each group to a grand summary under the main order number; or again it may be necessary to record all costs by classes and make up the total cost of a given product from class costs. In still more complex cases the main parts of a machine may be made on a special production order while many auxiliary parts may be used to complete it that have been manufactured on class order numbers. In the last method the drawing list Figure 5 is an essential feature of the productive process.

157. *Lump costs.*—In continuous processes or where the conditions of manufacture are such that the lots of material follow each other in such a manner that the workmen cannot distinguish one lot from another the production order method does not apply and the method of arriving at costs must be different from that of the foregoing outline, though the fundamental principles are the same. A consideration of a simple case such as a cement mill may make the general method clear. Here the material flows in a continuous stream through the several processes and the output is more dependent on

¹ In the *American Machinist* of May 16, 1912, on page 703 will be found a description of a cost recording system arranged by classes as used by a manufacturer of both standard and special pumps.

the machines than on the workmen. The material, moreover, passes through all of the machines so that the mill, so far as finding total costs is concerned, may be treated as a single machine. The problem is still further simplified by the fact that the material in process at any one time is not of great value as compared with the monthly output and can, therefore, be neglected in computing costs. It is evident that all that is necessary so far as total costs are concerned is to find the total labor and expense incurred during a given period and divide this total by the output for the same period as explained in Section 111. This output may be expressed by weight or bulk, that is, by pounds or barrel. The dividend so obtained will be the amount which must be added to the material cost of each unit of output to cover the labor and expense of production.

158. *Department costs.*—If it be desired to know the cost of each process or department of a continuous process industry, labor and expense costs must be kept by processes or departments, but they could be distributed, as before, by simple division on a material basis and this will indicate the general method to be pursued in more complex cases. Thus a common method of handling process costs in mixed manufacturing, where several lines of work may make use of the same process in varying amounts, is as follows: A standing order number is issued for the process concerned and to this number will be charged all labor and expense, if the latter can be segregated. The total amount of these items for any period, divided by the total weight or volume of all of the manufactured product passed through the process for the same period, will give the unit cost which must be charged against each unit of each kind of material which has passed through the process. If the expense cannot

be allocated to each process the unit labor cost can be ascertained as above and this can be used as a basis of distributing the burden to each unit of product.

Where the value of the material in process is small compared to the total output for the month the simple methods outlined above will suffice; but in complex cases where practically the entire factory consists of processes involving several lines of product and where the cost of material in process is considerable, the cost-finding methods are more difficult. No general rules can be laid down for such cases and each problem must be studied independently, individual judgment entering largely into the solution of each set of conditions. A brief discussion,¹ even, of this feature of cost finding is beyond the scope of this book.

159. *Indexing cost summaries.*—It is clear that in a busy factory turning out many jobs monthly the cost summary cards will increase rapidly. They should therefore be filed in some systematic manner, and if necessary indexed in some way so as to make reference to them quick and accurate. In many cases an alphabetical index by customers' names may be sufficient; but in most cases filing and indexing by classes is necessary. Thus all generator costs may be filed together, all induction motor costs may be filed by themselves and so on. In the system referred to in the footnote on page 370 the method of filing and indexing by classes is very fully worked out. Thus in that system all cylinder head costs are filed together, all connecting-rod costs are filed together and so on. Clearly a good index makes the cost records very much more effective, in fact, in large systems it is indispensable.

¹ A brief and clear discussion of this problem will be found in "The Science of Accounts," by H. Bentley, page 237.

160. *Relation between general accounts and cost accounts.*—From the foregoing discussion the relation between the general books and the cost accounts will be clear. The general accounts, as a rule, consider the operations of an enterprise as a whole. The entries in these books cover the exchange of values between the organization and other organizations or individuals. They do not take cognizance in detail of inventories, changes in plant valuation, and manufacturing expenses. The cost accounts, on the other hand, are concerned with the movements of values in detail within the organization. They are particularly concerned with inventories, depreciation, the distribution of manufacturing expense and similar items.

Cost accounts should be regarded as detailed statements or amplifications of the condensed statements shown in the general accounts. They should give in detail the causes which produce the totals and enable the manager to reason intelligently regarding these totals.

It should be carefully noted that so far as finding the total profit or loss of any enterprise is concerned cost accounts are not generally necessary. Thus, referring to Figure 3, it will be seen that all the items necessary to show profit or loss can be found from the general accounts excepting the items of inventory. As before noted, these inventory values may be found by visual appraisal. In many enterprises this practice still prevails, though, as has been stated, it is to be recommended only as a check on the more advanced inventory methods that have been discussed.

It is customary in most enterprises to show the results of the manufacturing and trading parts of the business by what are called "manufacturing" and "trading" ac-

counts. On the debit of the manufacturing account is placed the inventory value of the material in stores and in process at the beginning of the period under consideration, while the value of the same items at the end of the period is placed on the credit side. The difference is the gain or loss in these values. The value of the purchases and the wages paid during this period with all legitimate manufacturing expenses are also placed on the debit side. The balance of the account, representing cost of manufacture, is charged to the trading account, on the credit side of which are placed the receipts from sales. The selling and administrative expenses are also charged to the trading account. The difference between the two sides of the account shows whether a gain or loss has been sustained during the period under discussion.¹

To ascertain the total profits, therefore, it is not necessary to know the manufacturing cost of individual pieces of product, the total cost and total sales only being needed, provided an inventory is made at the beginning or end of each period for which a financial statement is made. There are many concerns in this country that still operate on this plan of selling at market prices regardless of manufacturing cost and relying on a periodic inventory to find out whether a loss or gain has been sustained. Such an inventory cannot be conveniently made, in most cases, more frequently than semi-annually and the danger of such a method is self-evident. On the other hand, many accountants and auditors have little faith in cost accounting methods and prefer to deal with values which are definite, as is the case with direct expenditures for material and wages and inventory values based on visual examination of the as-

¹ See discussion of this subject in the text on "Accounting Practice."

sets. They prefer this method of ascertaining the total cost of the manufactured product.

A cost system may, therefore, be operated with little relation to the general accounts. It might, indeed, be useful to the shop manager as a guide in operating the factory and serve also to fix selling prices, without being closely interlocked with the general books. It should not be forgotten, however, that if the cost system is at all accurate the sum of the detail values which it shows should agree closely with the corresponding totals as found in the general accounts. For this reason the cost accounts should be closely connected with and merged into the general accounts. In very simple cases, the general books may include all such detailed costs as are collected.

In a manufacturing business, for instance, the following accounts might appear among the general accounts:

- Machinery and Equipment.
- Reserve for Depreciation.
- Patterns and Drawings.
- Small Tools.
- Raw Materials.
- Manufactured Parts.
- Factory Supplies.
- Manufacturing Expenses.
- Goods in Process.
- Finished Products.

Clearly these accounts must be fed from the cost accounts and it is possible to create such general accounts as will serve to collect the totals of the cost accounts. If the cost accounting be correct, the totals thus obtained should check closely with the totals that are found di-

rectly from the pay roll, the cost of purchases, and other accurate sources of value. Thus the sum of the wages which are charged in the cost accounts against productive orders and which appear in detail in the several job accounts should agree with the total direct pay roll as reported by the paymaster. The total manufacturing expense charged in detail through the cost accounts should agree closely with the totals of such expenses as shown by the purchases and indirect pay roll. The material charges, however, cannot be made to check so exactly, since the element of waste and similar losses cannot be accurately evaluated; but even these totals should not differ greatly. If they do differ widely the error should be found. In general, of course, the error is more likely to be found in the cost accounts than in the general accounts.

The degree to which the general accounts and the cost accounts may thus interlock will, necessarily, vary with the conditions and the opinions of those concerned. It seems that, in this country at least, the tendency is toward a closer relationship between the two sets of accounts. This is logical since, as has been noted, the cost accounts are really an amplification of the general statements and should be accurate enough to check, at least fairly well, with the more accurate general accounts.

CHAPTER XIII

STATISTICAL RECORDS AND REPORTS

161. *Reports in general.*—It was noted in the preceding chapter that the three principal uses of a cost system were to show the actual cost of operations, to assist in predicting future performances and to form the basis of managerial reports. The first two items were discussed in the last chapter and it remains to consider the last of these three features of cost accounting.

In an industrial enterprise of any considerable magnitude it is impossible for the manager to keep under his immediate and personal control much more than the general direction of the business. He must delegate responsibility and authority to those directly under him and these in turn must still further delegate responsibility and authority to those under their direction, and so on down the entire line of organization.

As the enterprise grows the duties of the higher officials become more and more of a supervisory nature and details must, more and more, be trusted to subordinates. But as the business grows it also becomes more and more difficult for those in authority to see, by personal observation alone, exactly what is transpiring under them; while at the same time it becomes increasingly important and necessary that they have a clear conception of these matters if they are to successfully guide the enterprise. Someone has said that the secret of success in management is to organize, deputize and supervise the activities of the enterprise, and in a rough way this does ex-

press the general principles concerned. If the manager cannot personally perceive what is transpiring under him, he must organize his methods in some way so that all tendencies and indicative results are brought before him in a clear light.

162. *Financial statements.*—Since commercial success is measured in money, it is natural for him to look for such financial statements as will throw light on his problems and he turns to his general accounting books for such help as they may give. In so far as general results are concerned these are helpful and the balance sheet and profit and loss account, containing as they do a summary of what has transpired, are very helpful in problems of management. But these statements are given to him only at long intervals while his daily problems of management demand up-to-date information regarding many details of the business that do not appear separately in the general statements, but which may be found in the cost system in one form or another. From the foregoing chapters it will be evident that a manager cannot find this information himself; but if he knows the content and form of the information desired, the cost system can be arranged so as to supply it automatically and periodically.

163. *Value of reports.*—This broader conception of cost finding as a means of measuring and controlling industrial activities is not very generally appreciated. A system of carefully selected reports is the only method by which a manager can form an intelligent estimate of the controllable and uncontrollable factors of his business and is the best way by which to find the need of betterments and to direct their enforcement intelligently. The number and character of the reports which a manager may consider necessary will differ with the indus-

try and, moreover, may not all be based upon the cost system. It is evident though that a cost-finding system is necessary for most of the important managerial reports of a manufacturing enterprise. The profit and loss statement can usually be made up at the end of the year, or such other times as an inventory is taken, with no reference to a cost system; but if it is desired to make a monthly statement as illustrated in Figure 3, it is obvious that some regular method must be employed to evaluate the cost of such items as material, work in process and finished product.

164. *Departmental and other reports.*—Aside, then, from the financial reports that grow naturally out of the general accounting it may be good policy to call for special reports from departments or such other activities as will best serve to indicate the trend of the business. The sales department, for instance, should make a periodic report showing the amount and character of sales, and similar information. It should also send in special reports bearing on any movement in the field that will be useful in manufacturing. From the shipping department the manager should receive a report of product on hand and from this and a manufacturing report of the orders in process he can intelligently place new shop orders. Other departmental reports of a similar character make the solutions to other problems of management more sure and accurate. The periodicity of these departmental reports may vary; but in most cases they are rendered monthly. Some accountants prefer to make such reports every four weeks thus making thirteen periods a year.

Of the reports depending on the cost system none is more important than the so-called monthly statement (Figure 3), which is a concise statement of the condition

of the business at the time considered. The sources of some of the items are, of course, found in the general books, but unless a good cost-finding system is in use the items of material, work in progress and finished product cannot be evaluated on short notice. The methods of evaluating these items have been fully explained in previous chapters and will not be further discussed except to note that these values are always available from the several ledgers of the cost system and the ledger accounts of the general books.

165. *Labor reports.*—Reports such as those just mentioned can be abstracted from the general books and subsidiary ledgers without special effort, but there are other reports that are exceedingly useful which in most cases must be specially compiled. One of the most important of these is the labor report which is usually compiled weekly. Referring to Section 149, it will be remembered that the work cards were sorted, first by workmen's numbers so as to make up or to check the payroll, and afterwards sorted by production numbers so as to distribute the wages against production orders. If they are now sorted by classes of labor a report such as illustrated in Figure 23 results. This last sorting process can be greatly facilitated by giving distinctive colors to the several classes of work cards so that they can be sorted visually. This is especially true since, in this case, total results only are desired. The labor report is a classified statement of all expenditures for labor; and enables the manager to see at a glance where money that has been paid out in salaries has gone and to keep a check upon all expenditures. Such a report is made more valuable if compiled in a comparative manner. Thus if the record of preceding weeks is shown as indicated in Figure 23, or if the average of former records

BROWN MFG. CO.

LABOR REPORT

WEEK ENDING

ACCT. NO.	CLASS OF LABOR	WEEK ENDING	WEEK ENDING	WEEK ENDING	SAME PERIOD LAST YEAR
	DIRECT LABOR				
A	A.C.GENERATORS				
B	INDUCTION MOTORS				
L	DIRECT CURRENT GENERATORS				
M	TRANSFORMERS				
RA	ARC LAMPS				
UA	SMALL MOTORS				
S	LIGHTNING ARRESTERS				
O	MISCELLANEOUS				
	UNIT COST DEPT'S				
	IRON FOUNDRY				
	BRASS FOUNDRY				
	TOTAL DIRECT LABOR				
	MANUFACTURING EXPENSE				
900	FACTORY SUPERVISION				
201	STENOGRAPHERS				
202	PRODUCTION CLERKS				
203	COST CLERKS				
204	STORES CLERKS				
205	SHIPPING CLERKS				
206	OTHER CLERKS				
207	OFFICE BOYS				
212	FOREMEN AND ASSISTANTS				
213	INSPECTORS				
214	ELEVATOR AND CRANE MEN				
215	WATCHMEN				
216	GATEMEN				
217	CLEANERS AND OILERS				
218	HELPERS AND LABORERS				
219	SHIPPING CLERKS AND HELPERS				
220	OUTSIDE CONSTRUCTION MEN				
221	PACKING				
222	YARD TRANSPORTATION				
223	STABLE AND GARAGE SERVICE				
224	FACTORY ERRORS				
225	FIRE DEPARTMENT				
226	ALL OTHER SERVICE				
	TOTAL MFG. EXPENSE LABOR				
	POWER HEAT AND LIGHT				
	MAINTENANCE OF PROPERTY				
301	BUILDINGS				
302	PIPING AND WIRING				
303	MACHINERY AND TOOLS				
304	PATTERNS				
305	MISCELLANEOUS				
	TOTAL MAINTENANCE OF PROPERTY				
	TOTAL INDIRECT LABOR				
	PLANT INVESTMENT				
	OPEN ACCOUNTS				
	ENGINEERING				
	EXPERIMENTAL				
	TOTAL OPEN ACCOUNTS				
	TOTAL PAY ROLL				

FIGURE 23

or the records of corresponding periods of the preceding year are given the general tendency is made much clearer.

166. *Utilizing labor reports.*—Care should be taken, however, in drawing conclusions between different classes of labor on the same report and at the same period. Thus the ratio of indirect labor to direct labor is often taken as a criterion of efficiency of production. While indirect labor must always be carefully watched and while the ratio is often an important indication of tendencies it is not always a criterion of increasing or decreasing efficiency. Suppose, for instance, that certain operations are being performed on cheap standard tools by high priced men in such a manner that the direct labor cost is large but can be accurately allocated against production orders. Suppose now that because of increased quantity it has become possible to transfer this work to high priced automatic machines located in an automatic machine department where, because of the nature of the work, all labor is indirect. The direct labor formerly charged against this class of product is now replaced entirely by an indirect labor charge, and perhaps a heavier machine rate charge is imposed because of the more valuable equipment. Yet the cost of the product may be very greatly reduced because of this change in manufacturing method, though the ratio of direct to indirect labor would give no indication of the fact.

167. *Special reports.*—A well-kept cost system is a mine of information for the thoughtful manager. In addition to regular reports such as the labor report just discussed he may find much assistance in special reports. Thus in case the cost record shows that money has been lost on a contract the cost keeper should be able to fur-

nish a detailed statement of all labor and material that has gone into the work. Such a statement is invaluable either in finding out what is wrong or in proceeding to remedy the difficulty. Until a manager has made a

EXPENSE ANALYSIS SHEET		FORM.....	
POWER HEAT AND LIGHT		DATE.....	
ACC'T NO.	CHARACTER OF EXPENSE	FOR MONTH OF.....	FOR PERIOD TO DATE
	LABOR		
	ENGINEERS		
	FIREMEN		
	HELPERS		
	REPAIR LABOR		
	SUPPLIES		
	COAL		
	SHOVELS		
	BARROWS		
	OIL		
	MISCELLANEOUS		
	REPAIR MATERIAL		
	BOILER REPAIRS		
	ENGINE REPAIRS		
	GASKETS AND PACKING		
	MISCELLANEOUS		
	DEPRECIATION, INSURANCE, ETC.		
	TOTAL		
DEP'T	DISTRIBUTION BY DEPARTMENTS		
A	PER CENT OF TOTAL	6	
B	" " " "	12	
C	" " " "	11	
D	" " " "	27	
E	" " " "	25	
F	" " " "	19	
	TOTALS	100	

FIGURE 24

study of the cost of producing a given part, by means of such a special cost report, in company with his designer, tool-maker, manufacturing superintendent and others interested he will not fully appreciate the full value of accurate costs.

Another very important class of reports founded on the cost system comprises the analyses of expense. These may be in any detail desirable from a general summary of expenses to detailed departmental reports. Figure 24 illustrates an analysis of a heat, light and power account showing the cost by items, monthly, and also the totals to date as well as a digest of the distribution of the total by departments. Reports of this kind are of great variety and are exceedingly useful to the manager.

There are many other reports that are based more or less on the cost records as, for instance, the progress report which gives a statement of the condition of all orders in process of production; but enough has been said to illustrate the statistical value of these records aside from the finding of particular costs.

168. *Form of reports.*—The form in which statistical reports are presented is of great importance. All statistical data gain in value if presented in such a manner that contrasts and comparisons may be drawn. Thus in Figure 22 the costs are so presented that the maximum, minimum and average costs of a large number of pieces of one kind can be computed easily and quickly. In Figure 24 a comparison between the data for the given month and the average for the period since the first of the year is made with ease.

It may be important to know the value of the output of the factory for a given period, but it is more valuable to know the output per unit of capital invested or per employé at work. The total amount of coal burned in the power plant for the month is worth knowing, but the cost of the coal burned per horse power hour is a much more intelligent check on the efficiency of the power station. The cost of a given article is an

important matter, but its comparative cost judged by other performances may be much more important.

169. *Standards.*—The value of all statistical data is enhanced by comparison with other data of a similar character. This is clearly illustrated in Figure 24. If standards of performance can be established cost data can be interpreted with even greater accuracy and intelligence. This is illustrated in the case of the power plant just referred to. The amount of coal per horsepower hour that should be consumed under normal conditions in a given power house can be determined with fair accuracy and any departure therefrom should be explainable on the analysis sheet. The whole tendency in modern manufacturing and industrial enterprise is to find standards of performance which can be used not only as a criterion after completion, but as a means of predicting performance before it is started. Viewed from this standpoint the importance of cost-finding is self-evident and its value to the manager increases as competition becomes keener.

170. *Graphical reports.*—The comparison of statistical results with each other and with a common standard is greatly facilitated by graphical methods which show the history of any item being examined. This method also makes comparison between different sets of data much easier and indicates tendencies much more clearly than tabulated statements which are always difficult to summarize visually. Figure 25 shows, graphically, the history of a set of costs incurred in operating a power house similar to those listed in Figure 24. The tendencies of such accounts can thus be checked much more readily than when the same values are expressed in tabulated figures. In the illustration a sudden rise is shown on the curve of totals about February 28th.

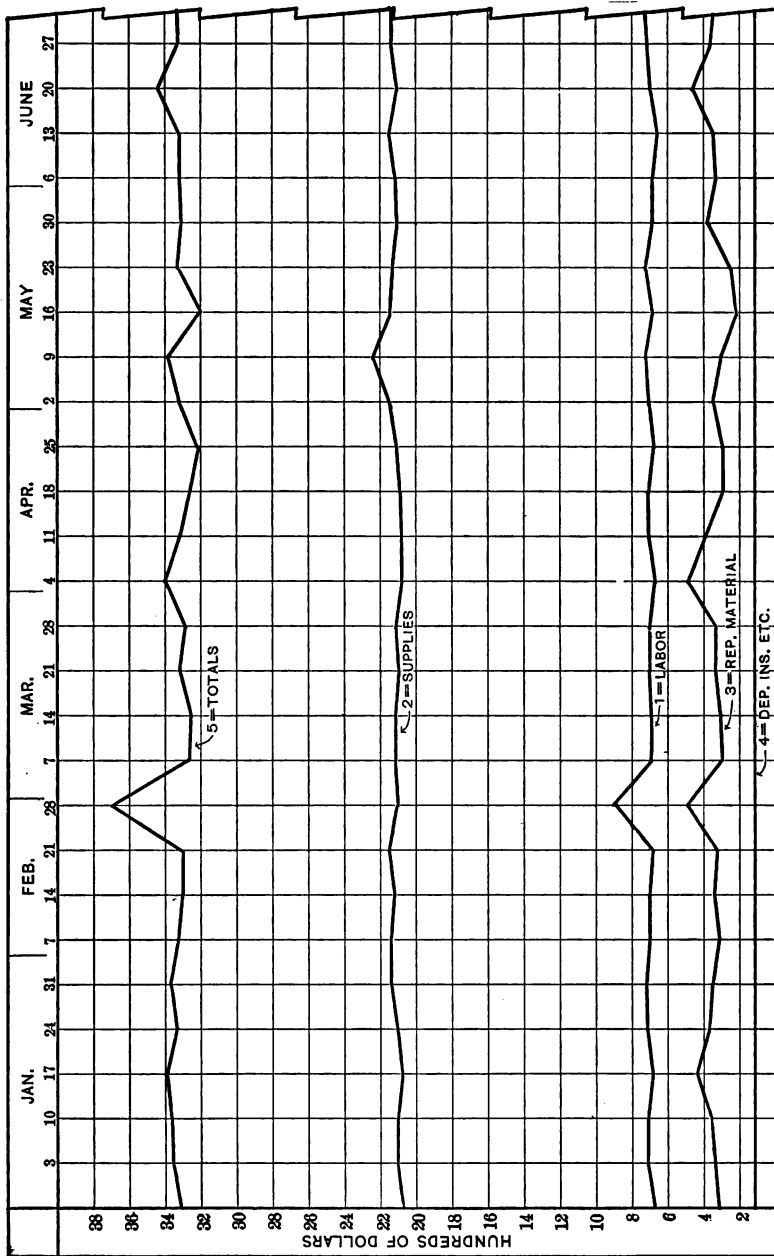


FIGURE 25—GRAPHIC RECORD OF POWER-HOUSE EXPENSE

The origin of this rise is easily traceable in curves 1 and 3 and, obviously, is due to some repair work. The principle is of very wide application and is very useful in all cases where large numbers of figures are to be assembled in tangible form.

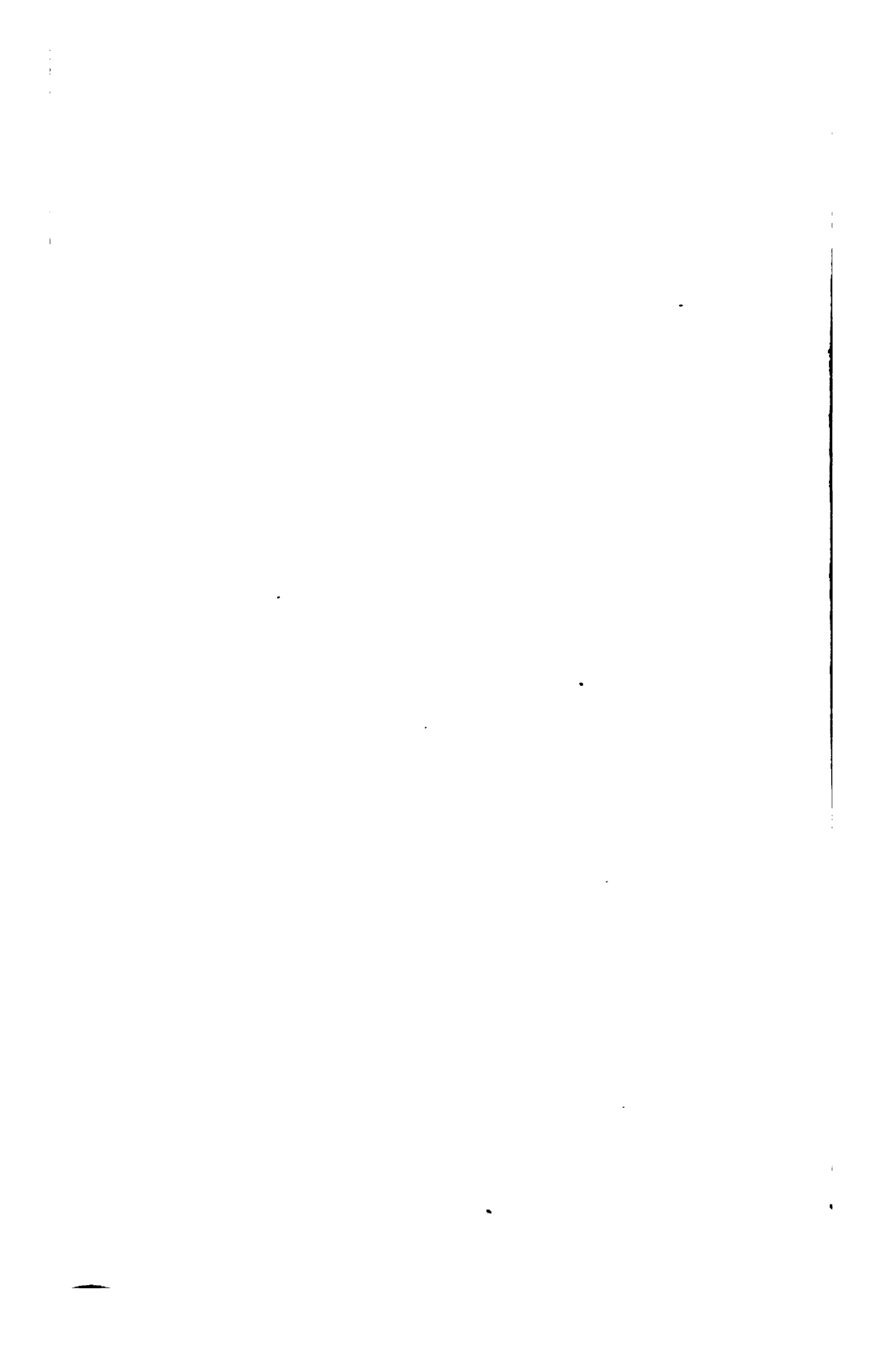
Cost reports of all kinds are made more valuable if they are discussed by a committee of those directly interested in the data that they present. A discussion of committees and committee systems is beyond the scope of this treatise, but brief reflection will show that this method of discussing cost reports offers one of the widest possible uses for them and makes them of educative value to all concerned.

171. *Conclusions.*—The discussion in the foregoing chapters will have made it clear that no one method of cost finding can be laid down that will answer the requirements of every situation. Each case must be studied independently and a system selected that will be applicable to the problem in hand. The general principles discussed hold true, however, for all cost-finding methods though the exact manner of their application must differ with circumstances.

It is of prime importance, therefore, that the executive, in installing a cost-finding system or in operating one already installed, should have a clear idea of just what result it is desired to obtain. A cost-finding system should be planned in advance as much as if not more than any other part of the factory system. It should obtain just the results wished for and it should not gather a lot of useless data. A cost-finding system can fail because of too much detail as easily as it can because of lack of results. It is of importance, also, that the results obtained are made use of. Cost data which are not used represent wasted money and it requires the

knowledge and judgment of an intelligent man, well informed in the details of the business to successfully plan and operate a cost-finding system, if the problem is at all complex.

The introduction of a cost-finding system is often difficult. This is true partly because the human element enters largely into the success or failure of nearly all so called "systems." Workmen are not, in general, interested in cost-finding methods, foremen are often antagonistic and even the superintendent may be apathetic. It often takes considerable time and persistence to get a cost-finding system operating successfully, and it nearly always requires the firm support of the managing executive to bring it to a working success and maintain it thus. When, however, the executive has once developed a cost-finding system that presents to him the complete costs of his units of production, that shows him in intelligent detail where the money has gone—whether for direct or indirect production, that shows him the relative values of different methods and enables him to check inefficiency in machine, process or employé, he has obtained the best possible weapon against failure and a guide to future operations that must be experienced to be appreciated. The need of a cost-finding system of some sort is so basic that it is marvelous indeed that any man would think of operating a factory without one, and, without doubt, wherever competition is a factor, a cost-finding system will be the corner stone of the factory of the future.



QUIZ QUESTIONS

(The numbers refer to the numbered sections in the text.)

AUDITING

CHAPTER I

1. What is the usual definition of an audit? Is criticism the chief duty of an auditor? What additional qualifications should he have?

2. Is an auditor's duty confined to a detection of errors? Can he always successfully prove wrongdoing when he is satisfied that it exists? How does he differ from the bookkeeper?

3. Is a theoretical education in business principles possible or valuable? What is true education? How does it aid practical experience? How do the analytical faculty and the imagination help the auditor?

4. Into what two classes are accounting professions divided?

CHAPTER II

5. What are the objects of an audit? What does the word "fraud" in the first object cover? What is the usual history of criminal frauds?

6. In investigating for suspected fraud what preliminary scrutiny should the auditor make? To what extent should he investigate suspicious entries, and why?

7. Are errors in mechanical accuracy necessarily suspicious? To what extent should small errors in a trial balance be investigated and why? Describe the analytical method of finding errors in a trial balance and state its advantages.

8. What is the principal effect of errors of principle? In what part of the accounts are they most apt to be found? Give some instances.

CHAPTER III

9. What is a single entry set of books? Is more than one book essential? How much of an audit is it possible to make of such a system? How are profits ascertained?

10. Is single entry ever admissible? Outline such a set for executors, assignees, produce commission merchants or a renting agent. Why cannot a trial balance be taken of such a set?

11. When does single entry show its inadequacy? What conditions necessitate more complex accounts? How does double entry meet these conditions? How does the trial balance exemplify the advantages of double entry?

CHAPTER IV

12. In what character of business is double entry necessary? Explain why sales on credit demand double entry; or long-time bond sales, etc. Why is double entry advantageous in these kinds of business?

13. What does double entry provide? What is its foundation? Give one or more rules for making journal entries. Describe the method known as personification of the accounts.

14. Explain the fundamental principles of debit and credit. Are all credit balances liabilities? What six classifications may be made before determining whether an item is a debit or credit?

15. Discuss the relationship of the business to the proprietor. Can capital be considered a liability of the business? If so, how can expense and other nominal accounts be considered? What then is the profit and loss statement?

16. Give a sketch of the evolution of modern accounts from the day book or journal. Why is a cash book really a journal? Explain the journal character of any other book from which postings are made. Is, or is not, anything gained by journalizing all entries, and why?

17. Is it advisable to journalize all entries? What are the objections? What may be done instead?

CHAPTER V

18. In starting an audit what item would be the first to be verified? If there are checks in the cash, what should be noted in regard to them? What is the proper system of handling incoming cash?

19. How can a defalcation be concealed by "lapping" or holding over remittances? How does the practice of copying deposit tickets in an impression book fail to prevent it? What is the fallacy of depending on stubs or carbon copies of receipt blanks?

20. How can this method of making an independent list of remittances be made to save labor, where many items are received? What is the advantage of depositing all the receipts in bank?

21. Describe the "imprest system" of keeping the

petty cash. In order to have all checks drawn appear on the cash book, how should checks given in exchange for currency be handled? And checks cashed for others?

22. What should the auditor do in regard to due-bills of officers and employees found in the cash? How should temporary unadjusted items be dealt with, in place of carrying them in the cash?

23. Should the auditor be satisfied with ascertaining that the bank account is correct at the end of a fiscal period? How can the account be manipulated between audits? If bank columns are carried in the cash-book, how can stubs be dispensed with?

24. What is the auditor's duty in regard to the reconciliation of the bank account? What is the ordinary form of a reconciliation statement? Describe the four table form and the balanced statement. To what other reconciliations is it applicable?

25. What is the usual form of a cash-book? Why is it advisable sometimes to have the receipts and disbursements in separate books? What is the disadvantage of this plan?

26. Describe some form of a columnar cash-book. In what two ways can cash discount be treated in the cash-book? What are the advantages of the modern method? What is the danger of too extended a columnization of books involving cash? Give an illustration, other than the one given in the text.

27. What is the objection to a loose-leaf form of cash-book?

CHAPTER VI

28. Why is notes receivable a better term than bills receivable? What is the origin of the latter? What

is the usual idea in America in regard to a draft or bill drawn on a customer? What is the best way to register bills receivable when there are many of them?

29. When a note is discounted, to what account should it be credited? Why? What entry is made when the note is paid? How do discounted notes appear on the balance sheet?

30. How can a customer's liability on note account be best kept track of, for the information of the credit man?

31. How should the auditor verify the bills receivable in ordinary cases? What additional precaution should be taken in verifying the notes held by a bank?

32. Why is unearned interest on bills receivable seldom taken into consideration in ordinary business houses? How can it be easily found in a bank?

33. Why is the term accounts receivable objectionable and what should be substituted for it? Describe the controlling and subsidiary accounts in this connection. To carry a controlling account how should the books of original entry be arranged?

34. What items are sometimes listed by bookkeepers as accounts receivable, erroneously from the auditor's viewpoint? What is the auditor's duty in regard to them in preparing a balance sheet?

35. How should the auditor classify accounts receivable? How should items in suspense be treated and how should the prospective loss on them be taken care of? Can any fixed rule be given for the classification of accounts into good, doubtful and bad?

36. What is the auditor's duty in closing books at the end of a fiscal period in regard to providing against loss from bad debts? To what account should actual

losses be charged? What should guide in estimating the amount to be set up as a reserve for bad debts?

37. Is it necessary to check the accounts receivable in detail? If no controlling account is kept, how can the auditor verify the account by totals? What is the best way of verifying the accuracy of customers' accounts? What precaution should the auditor take when sending out verifying statements?

CHAPTER VII

38. To what extent is the auditor usually responsible for inventories? Why can he usually depend on the quantities reported as on hand by responsible employes? Should he be satisfied to adopt the entire inventory as given to him?

39. What is "raw material"? How can the same thing be both "finished product" and raw material?

40. What is the basis of valuation and how does a drop in the market value affect it? What broad principles of profit should be adopted?

41. What are elements of cost besides the price actually paid? Against the inclusion in the inventory of what items should the auditor guard?

42. What is "product in process," "finished product"? How should they be valued in an inventory? What is the objection to valuing at selling price less estimated cost of selling?

43. In a combination of companies into one, how should an underlying company charge out its product to another underlying company which will use it as raw material? Give reasons.

44. Why should the basis of an inventory always

be the same in the same company? Why is it also important that the true basis (i. e. cost) should be used?

45. What are the elements of cost of fixed assets, such as machinery and tools?

46. How should a factory value these things when it makes them itself? Explain the difference between a saving and a profit.

CHAPTER VIII

47. What is depreciation? How does it differ from fluctuation? Is the latter ever taken into consideration in reference to the surplus? When must it find expression in the accounts?

48. Why must depreciation always find expression in the accounts? Why do not repairs do away with the necessity for depreciation allowance?

49. What are the causes of depreciation?

50. What are the elements of depreciation, determining the amount to be charged off? Is it feasible to establish a general table of depreciation applicable to all classes of assets?

51. What are the different methods of charging depreciation? Discuss the four plans usually followed and state your own preference and the reasons for it.

52. Is the amount of depreciation to be allowed, a certain quantity or an estimate? What is the duty of the auditor in verifying the estimate? Of what value in this connection is the periodical appraisal by an expert?

53. In what ways is depreciation expressed on the books? What in your opinion is the best method? If a reserve is set up what entries are made when an asset is

finally discarded? How can a combination of two of the methods be used to advantage?

54. What entries should be made when a depreciated asset is sold? What book may be kept for entries of such assets?

CHAPTER IX

55. At what value should buildings owned by the business be carried on the books? What elements constitute that value? When does cost stop and operating expense begin? What will increase the asset value of a building while in use?

56. What special element governs the rate of depreciation? How should building expenses be treated in the accounts?

57. What is the basis of the valuation of land owned by the business? What additions to original cost are permissible?

58. What is the objection to writing up the book value of unsold land when market value has increased?

59. How should land donated to a factory conditionally, be treated on the books before title is acquired; how, after conditions are met, and title acquired? Discuss the different methods suggested and state your preference and the reasons for it.

60. How does the treatment of land bought for resale differ from that of land bought as a permanent investment? In selling lots from a sub-division, what would constitute the cost and how should unsold lots be valued? Is it correct to add interest on the capital invested to the cost of the land?

61. Criticise the expression "real estate and buildings."

62. What is the auditor's duty in regard to the valu-

ation of patterns? To what should special patterns for specific work be charged? How should patterns be depreciated?

63. What is the basis for the valuation of patents? When only should they be given a greater value than the actual cost of getting them out? What elements other than lapse of time may govern depreciation? What is the auditor's duty in case one or more companies in a merger desire to capitalize their patents?

CHAPTER X

64. To what account may the expense of putting a business on a paying basis be charged?

65. Why can no satisfactory definition be given of good-will? What does it, in general, consist of? Is there a property right in it?

66. What rights has the purchaser of good-will? What is the position of the seller in respect to competition with the buyer? What part does the name of the business play in a transfer of good-will; also trade marks?

67. When does the valuation of good-will come under the notice of the auditor? How does the attitude of the seller affect the valuation? What is the principal basis of valuation, and what elements affect it? Does it differ as between individuals, partners and corporations?

68. Why should a sufficient number of years be taken into account in fixing the earning power? What should the auditor note as the essential to averaging earnings?

69. How may average earning power be determined? Should variations in the earning power be allowed to affect the valuation of good-will?

70. What should be the relation of good-will to profits? Should good-will, once legitimately put into the accounts, ever be charged off? How can good-will be recognized and paid for in acquiring a business, without putting it on the books?

71. What illegitimate use is made of the good-will account? What is the auditor's duty when he encounters it? Explain the expression "number of years purchase"? What does the capitalization of earnings mean and how is it calculated? If good-will is charged off, does it establish a secret reserve?

72. What are deferred charges carried as assets? Why are they thus carried? Give some examples?

73. When may advertising be regarded as a deferred charge?

74. What entries may be made for development expenses; when are these not deferred charges?

75. Give examples of other deferred charges. Should a special account be opened for such a deferred charge as unexpired insurance? Is it advisable to open an inventory account?

CHAPTER XI

76. In examining the assets what kind of mis-statement is principally to be guarded against? What is the danger in regard to the liabilities? Why is it more difficult to detect error in the liabilities than in the assets?

77. How should accounts payable be verified? Why is it difficult to detect the suppression of accounts that may be due by the house? Why would not communicating with the creditors detect it? What should the

auditor do in regard to journal entries disposing of an account payable?

78. How are accounts payable that are accrued but not due, to be treated?

79. How should a street railroad treat its tickets; when they are sold; and when redeemed in fares? Can card tickets out of which each ride is punched be kept track of at all?

80. How are merchandise coupon books often treated by stores? What is the auditor's duty in regard to these classes of liabilities?

81. Why is it difficult to detect unrecorded notes payable? How could such a note exist without appearing on the books? What clues might lead the auditor to suspect the existence of such paper?

82. Under what conditions would he be relieved from responsibility if he did not detect the existence of such notes? What is often done with an individual bill of an officer of the company?

83. Why is accomodation paper hard to locate?

84. To what extent is the auditor interested in the different classifications of bonds? In an original investigation what should he investigate in regard to an issue of mortgage bonds; in regard to income bonds? When can a company substitute equivalent property for that covered by the bonds?

85. Why can unissued bonds be carried as an asset, while unissued stock cannot be? Can bonds be sold by the company at a discount?

86. What is the real nature of bond discount? What wrong deduction has been made from this fact?

87. What is the true theory of discount on bonds? What is the argument in favor of carrying the bond account at the net value? How would the discount be

treated under this plan? What is the auditor's duty in regard to the general treatment of bond discount?

88. If bonds are issued at a premium, how should the premium be treated?

89. In the case of bonds bought at a premium, what does each coupon represent when it is paid? On what basis is the real interest on such bonds calculated? How do bond dealers usually carry their bond holdings and how do they treat the interest on them?

90. What is a sinking fund? What should it consist of? What investments are preferable for it? Why are sinking fund bonds not canceled? When bonds are paid and canceled can they be charged to sinking fund?

91. Why is a sinking fund almost always established out of profits? Does this, in your opinion, mean that it is chargeable to profit and loss? What is the eventual result, when the bonds are finally redeemed? What is the effect on the apparent book-value of the company in the balance sheet? How does the Interstate Commerce Commission treat this question? Do you agree with them? What is the true function of a reserve account? What is the real nature of a fund?

CHAPTER XII

92. What differences exist between the capital of a partnership and of a corporation?

93. How is the excess of net assets over nominal capital expressed in a corporation? In what ways is a deficit often taken up in the accounts? When such deficit is covered up in the accounts what is the stock said to be?

94. What is the auditor's duty in regard to the legal

steps to be taken in incorporating a company? How is the subscription to the capital shown in the accounts? Describe the stock ledger and show why the stock should be credited to the holder. How are transfers of stock recorded on the stock ledger? Is the certificate of stock, the stock itself?

95. How is the payment for stock evidenced? What precaution should the auditor take in regard to stock issued for property? What is his duty in regard to the valuation of the property? What is his duty when stock is sold at varying prices? When salaries are paid in stock, how should they be charged on the books?

96. What is the auditor's duty as to verifying the issue of stock? What is his duty as to the outstanding stock in audits subsequent to full issue? Must he examine all transfers? If the stock does not balance how can he most easily detect the errors? How much is the auditor relieved from responsibility when stock is registered by a trust company?

97. What is the usual custom when stock is sold at a discount and the proceeds invested in fixed assets? What is the auditor's duty in regard to this discount? What should be done when the stock is issued directly for the purchase of fixed assets? If stock is sold at a premium what may be done with the premium? In the absence of special provisions what is its real character?

98. What is the duty of an auditor when a company has different classes of stock? How does a mis-statement of profits affect non-cumulative preferred stock?

99. What is the status as a liability of unpaid cumulative preferred dividends? In this regard how would a balance sheet for creditors differ from one for stockholders?

100. What is treasury stock? What are often wrongfully called treasury stock? Why should the auditor know the law in regard to treasury stock in the state by which the company's charter is issued? What is the position of treasury stock as to voting power and dividends?

101. How does stock usually get into the treasury? What credit should offset it when donated? What entries should be made when such stock is sold at a discount? Does donated treasury stock establish a surplus?

102. What is the auditor's duty if the balance sheet over-estimates the value of the company? If there is an under-estimate of net value, what is said to have been established? What is the usual object of a secret reserve? What are the opinions of some high authorities in regard to the auditor's duties when he discovers that a secret reserve has been established?

103. What is the objection to the practice? When it consists of unrealized values how can the true condition be stated?

CHAPTER XIII

104. What is the revenue account? Why is it divided into tables? What are the usual tables into which it is divided? Is there any inflexible rule for making up these tables? How can the auditor best decide as to the classification of the items? Why should he always follow the same plan in different periods of the same concern?

105. What is the objection to keeping purchases and sales in a single merchandise account? What items should be treated as deductions from sales and not as charges, and why? What is the auditor's duty in

regard to the method adopted for recording sales? How can salesmen's commissions be most easily taken care of?

106. How are shipments to branches often erroneously shown in the accounts? What is the objection to billing goods to branches at more than cost? What is the proper method?

107. How should installment sales be treated? Why should not the total sales be credited to revenue? Under what circumstance can full credit be taken for sales for future delivery? What precautions should the auditor take if this is done? What is the correct principle in regard to such sales?

108. What are the different methods of treating sales in the revenue account? What does each method show?

109. How is cash discount carried on the books of original entry? Explain the two methods usually used and the reasons for them. What is the auditor's principal concern in regard to it?

110. What attention should be paid to cash discount liable to be deducted in making up a balance sheet? What is the usual American idea as to the time at which it enters into the accounts? What two different views are taken of it as to whether it is a reduction of price or a capital expense or profit? What are the arguments for each view and the auditor's duty in regard to it?

111. Why should discount taken be kept separate from discount given? Why is it important that neither shall be mixed in the accounts with interest?

112. What is the distinction between cash discount and trade discount? Give a definition of each. What is the auditor's duty as to verifying cash discounts? Why should he pay any attention to trade discounts?

113. What is a voucher? Why are credits hard to verify? How is the auditor limited in regard to them?

114. What is the essential element in a voucher for payments? How can they best be audited? How may an apparently good voucher not be a real one? Give illustrations and state the auditor's responsibility in regard to them.

115. What should the auditor do when an office is careless about taking receipts for cash payments? Why are vouchers for journal entries necessary? How should an auditor scrutinize and identify vouchers? Why should not checks made to the personal order of an officer of a company be indorsed by him in blank? What is the duty of an auditor when he notices any such careless habits in an office?

116. Why should items in an expense column be especially carefully vouchered by the auditor? When are cancelled checks admissable as vouchers?

117. What is the auditor's duty in regard to pay-rolls? How many persons should have passed the pay-roll and certified the payment?

CHAPTER XIV

118. How were books "closed" originally? What is the "balance account"?

119. What items go into the third or profit and loss table of the revenue account? What are the net operating profits and net profits?

120. Why should percentages be made up from the foregoing tables? What use should the business be able to make of them?

121. What other method than percentages may be

used to show the rise and fall of the total amount of business?

122. Why is it important to find causes of loss and gain? What may the accountant and the cost accountant do to help the manager of the business?

123. Is it necessary to have separate revenue statements for each department of a business? If so, what information is it the duty of the auditor to acquire? What difficulties will he meet?

124. Why is the distribution of general expense even more difficult? What may be done in a department store to divide general expense among the departments?

125. What is done with the net profit from the profit and loss table? What further items go into the surplus account? What is the surplus? From what sources may it be derived? How may it be divided on the balance sheet? Why should extraordinary items be put into surplus rather than profit and loss?

126. How may a profit be correct from a bookkeeping standpoint and not one in the auditor's opinion?

127. What is one crucial test of a profit? Is a statement of profits in a going business a statement of facts or an opinion? Can interest on stockholders' capital be charged as a cost of development work?

128. What are capital expenditures? How should the cost of alterations that increase efficiency be treated? When ample reserves have been set up against the old assets, what is the treatment when new assets are bought to replace them? To what are ordinary repairs chargeable? How is the sale of a depreciated asset treated in the accounts?

CHAPTER XV

129. What is an essential to the payment of a dividend? What methods are sometimes followed?

130. What examination should the auditor make of the items in a balance sheet to determine whether a dividend is justified? In whom does the power to declare a dividend rest? What is the auditor's duty if he thinks the dividend not justified?

131. Is it always an essential that the money be on hand to pay a dividend? If not, what method may be adopted?

132. Can a board of directors ever be forced to pay a dividend?

133. What is the status of stockholders who have not paid up in full?

134. What is the difference between cumulative and non-cumulative preferred dividends? What is the relation between dividends on preferred and common stock?

135. What two methods of paying dividends are used and what are the entries necessitated by each? To whom is a dividend payable? What is meant by closing the transfer books?

136. What is a liquidating dividend? On what basis is it paid?

137. In a partnership where the profit-sharing rate is different from the ratio of capital, how is the excess above capital dividend? Under similar conditions when the capital is impaired, what should be the procedure when one or more of the partners have made loans to the business?

138. When there have been heavy losses, what is the danger in paying liquidating dividends to partners in proportion to their capital? If the outcome is uncer-

tain what is the only safe plan to pursue, and why? Why does the profit sharing ratio apply to the losses disclosed by liquidation?

139. When does the distinction between principal and income most often come to the notice of the auditor?

140. In which category should profits on bonds or stock originally belonging to an estate be put?

141. How should wasting assets be treated? How should the premium on bonds held be treated?

142. What are usual charges against the principal of an estate? How should the following be treated; taxes, alterations and additions to property.

143. What should be done concerning contracts made by the testator? To whom should the trustees pay any profits from the contracts? Are the expenses of management chargeable against income or principal?

144. What accrued income belongs to the principal? What is the difference between British and American practice in regard to dividends on stock held?

145. What should be done in regard to the division between principal and income when a company declares a dividend larger or smaller than its actual earnings for the period?

146. What is the difficulty encountered when extraordinary cash dividends, or stock dividends are paid on stock held? What are the arguments for and against giving them to the principal? What conflicting decisions have been rendered? Why does the Pennsylvania rule seem to be most equitable? In all these conditions what should the auditor advise his client to do? How should he advise a holding company to treat dividends from underlying companies?

147. From what does the confusion in all these cases arise? What is a necessary quality of income? What,

however, must govern the final decision of the disposition of an item? How could attorneys save a great deal of confusion resulting from the different constructions of wills?

CHAPTER XVI

148. What should be the attitude of the auditor to his client? To what extent can he yield to his ideas? Why is the frequent audit better than the annual? Why should the auditor use the same assistants each time for the same client, as far as possible?

149. What should be his attitude to his client's clerical force? To what extent should he consult their convenience in arranging the work? In case of opposition what is his duty?

150. In a first audit what study should be made of the business? What use would he make of the information thus acquired? How would he use this information in subsequent audits? What reports should be made by the assistants? Can any inflexible rules be laid down as to the course to be followed in all audits? What is the essential thing in regard to the entire work?

151. What is the custom of many auditors in regard to abstracting the accounts? Describe this method in general. Why is this safer than checking the books? What are its other advantages? How can the closing entries and balance sheet be made by this method? How does it facilitate the work of a continuous audit?

152. Is it imperative that the auditor's report should always be in conventional form? What care should be taken to cover important items to which attention should be drawn? To what extent should details be put into a report? To what extent should improvements in the

office methods be recommended? What should his formal certificate cover?

CHAPTER XVII

153. What should be the auditor's attitude when a witness?

154. What are the two faults he is apt to fall into? What difficulties will he encounter?

155. Why should he have some general knowledge of the laws of evidence?

156. Why should he be modest as to his own ability? To what can he testify as an expert?

157. What are his limitations as an expert witness?

158. What is the great fault of many so-called systematizers?

159. In putting in a system what must the auditor avoid? What must he insist upon on the part of those in authority?

160. In instituting a system what is necessary besides a scrutiny of the accounts? Give an illustration of the further work required.

161. Why should the ordinary auditor not attempt to install an elaborate system of cost accounts? What are the general features of cost accounts? How is the general expense usually disposed of?

162. What are the advantages of loose-leaf books of account, especially ledgers? How can sales be advantageously handled on loose sheets?

163. What is the advantage of, and objections to a card ledger?

164. What is the Boston ledger and how can it be used to best advantage?

165. Why should the auditor not have any favorite form of books?

CHAPTER XVIII

166. To whom is an auditor responsible? Why is his responsibility not confined to the officers or directors who employ him? What is his duty in regard to suppressing facts known to the officers employing him? What is his duty to the stockholders?

167. What is an investigation as distinguished from a regular audit? How is the scope of an investigation determined? What is the responsibility of the auditor to a client proposing to invest his own funds? If there is no question of the honesty of the seller why is any investigation needed? What care should be exercised by the auditor in making his report on such an investigation? If his client is inexperienced, what is the duty of the auditor?

168. When acting for the promoter why should the auditor investigate his character? What inquiries should he make as to the sellers and the reasons for selling? Why should an auditor refuse to give even a certificate of clerical accuracy to a business which is likely to be fraudulent?

169. When his statements are to be used in a prospectus offering stock for sale why should an auditor be especially careful? When should he not state the average profits?

170. Is it allowable for him to state that he thinks the future business will be profitable? How far can he go in laying a foundation for such a prophecy?

171. What is the auditor's responsibility for the accuracy of his report? What reasonable care must he

take? May he be satisfied by simply verifying the accuracy of the books?

172. What is the auditor's duty if he thinks his instructions are inadequate? Should the amount of his fee influence him at all? What must be the paramount idea in all professional work?

173. What is the auditor's responsibility for his assistants? What sort of a staff is it necessary for him to have? What is the objection to an auditor's limiting himself only to such work as he can personally attend to? How can he effectively supervise a large staff of properly trained assistants?

174. Why should he avoid becoming too trustful of those whom he is auditing?

CHAPTER XIX

175. Can any one make a good accountant? What is one of the first requisites? Why is the power of analysis essential? What is requisite for a cost accountant?

176. Is an academic knowledge of accountancy sufficient for the auditor? Why is practical experience with an established accountant valuable?

177. Why is the profession interesting? What may he learn outside of strictly professional limits?

178. What will he encounter in the way of disappointments? Where can he find the greatest encouragement? What tends to develop a feeling of mutual helpfulness between the accountants themselves?

CHAPTER XX

179. What are the essential general steps in the first audit? What may be done in the first audit that will be helpful in succeeding investigations?

180. In the first audit, what is the first step? What items belong in the cash? How can he test the accuracy of the receipts shown by the cash-book? What special care must be taken with a columnar cash-book?

181. Why are the journal entries important? Why should competent authority be shown for all but trivial journal entries.

182. What are the correct entries of purchases and sales? Why should unshipped sales be not recorded? How can the outstanding liabilities be ascertained? How may bills payable that have not been entered be discovered? When is the auditor not blameable for not discovering these bills payable?

183. How should disbursement vouchers be checked? How may the individual items on the pay-roll be safeguarded? How may the auditor judge of the correctness of the petty cash?

184. What verification of notes receivable and of bonds, mortgages should be made? How should the ownership of land be verified? What is the auditor's responsibility in regard to inventories?

185. How may the individual accounts receivable be judged to be correct? How is the controlling account verified? With what should it be in balance?

186. What is the auditor's duty in the preparation of the profit and loss account and of the balance sheet? What should be included in these accounts?

187. How should assets subject to depreciation be shown in the balance sheet? In what order may the

balance sheet be prepared? What should be done with capital stock if there is unissued stock?

188. Define the abstracting method. What does it prove? What should the auditor do with the columns not abstracted? What columns of the purchase register must be verified?

189. On what points should the auditor be absolutely certain?

PART II

QUIZ QUESTIONS

COST-FINDING

CHAPTER I

1. What is the state of cost-finding so far as detailed cost is concerned in most industrial establishments?

2. Does the size of the enterprise affect the character of the cost-finding system? Why is this so? In what ways should a good cost system assist the manager? What difficulties may result from an over-elaborate system?

3. How can the manufacturing expert assist the accountant in installing and operating a cost system?

4. What is the connection between the principles which underlie cost-finding and the blanks and forms that are used in actual operation?

5. Why is cost-finding important to an industry as a whole? Why must the selling price be based sometimes on the market price, and not on the actual cost of production? To what extent should cost-finding methods and results be kept secret?

6. Is it possible for enterprises to exist and make money without cost-finding systems? Discuss the limitations of such methods and state the conditions that may compensate for lack of good cost-finding methods. What tendencies in modern industry make cost-finding methods increasingly conducive to financial failure?

CHAPTER II

7. Define the purposes and scope of general accounting. Discuss the relation between general accounting, bookkeeping and cost-finding.

8. Name the essential features of productive industry. Under what headings are these very often consolidated?

9. What do the summaries of the general accounts always show? Discuss the necessity of cost accounts as illustrated in the case of the farmer. Which of these accounts are usually most accurate? Why is this necessarily so?

10. Show that division of labor is an inherent feature of civilization. What modern industrial influences have aided in extending the use of this principle? Make a sketch showing a typical manufacturing organization with the three principal branches of productive industry properly located with reference to each other. In what division does the engineering department belong? Why is it not always so located?

11. Does every industry necessarily require all of these functions?

12. What is meant by departmentization? Make a sketch showing the departments of a large manufacturing organization in their proper relation to each other. What is meant by functional division of the work in departmentizing it? Why is this the correct basis for

departmentization? Discuss the separation of the planning of work from its actual execution.

13. In what way does the cost problem of a manufacturer differ from that a farmer?

14. What items of the monthly statement cannot be evaluated accurately from the general books? Discuss the relation of a visual inventory to this problem and show the need of a cost-finding system where a monthly statement is required.

15. What are the three principal functions that a good cost-finding system should perform?

16. Define direct material, indirect material, expense material, direct labor, productive labor, indirect labor and non-productive labor.

17. What abbreviations are sometimes used for the terms direct labor and direct material?

18. Why are the terms direct labor and indirect labor preferable to the terms productive labor and non-productive labor respectively?

19. What is meant by burden, overhead expense, and expense? What is the great problem of cost-finding with reference to expense?

20. Define and discuss manufacturing expense, factory expense, administrative or office expense and selling expense. Why are the last two sometimes grouped together? What name is then given to them?

21. What are the three natural primary elements of manufacturing cost? Define flat or prime cost. Define shop cost. Define factory cost or manufacturing cost. Define total cost. How is the selling price obtained from the total cost? Make a diagram showing the relation of the elements of cost using hypothetical numerical values. Wherein does the character of the profit differ from the other elements included in the selling price?

22. Discuss the relation of profit to the total output and the capitalization, showing the correct manner of fixing the cost price in order to obtain a given return on the capital invested.

CHAPTER III

23. Discuss the characteristics of the two general classes of accounts with which cost-finding is concerned. What is the first step in establishing a cost-finding system? Why should the classification of accounts as they appear in the general ledger be taken as a basis for cost-finding? Name some typical cost accounts that belong in the manufacturing expense.

24. Why is it necessary often to open up auxiliary ledgers? Name some of these ledgers in common use.

25. What considerations govern the need of a cost ledger?

26. Discuss the characteristics of a continuous-process industry.

27. Discuss the characteristics of an intermittent-process industry.

28. Discuss the characteristics of a combined continuous and intermittent-process industry. Why are the problems of cost-finding more difficult in such industries than in continuous-process industries?

29. Discuss the relation of the cost-finding system to the general problem of administration.

30. What is the general nature of orders? What is the general nature of returns?

31. Why is it necessary to have systematic methods of identifying tools, processes, departments and product in manufacturing?

32. What methods are in most common use?

33. Explain the use of drawing numbers.
34. Where do drawing lists originate and what is their use?
35. Why is it desirable that the plan of identification be so comprehensive as not to require extensive changes when the plant increases in size?

CHAPTER IV

36. How are the majority of material values formed? Why are all industrial enterprises more or less dependent on other industrial activities?
37. Define stores, store-room, stock and stock-room. What are the relations of the store-room and stock-room to other manufacturing activities? What is meant by "goods in process"? What is the purpose of a finished-parts store-room? What three classes of material may be handled in the store-room? Name the five stages through which material passes in being fabricated that are of distinct interest to the costkeeper.
38. Why should purchasing be centralized?
39. Where do the requisitions for indirect material naturally originate? Where may requisitions for direct material originate and why?
40. What information should a purchase order bear?
41. What is the nature of a receiving memorandum? How should it be formed?
42. What is the nature of a purchase-analysis book or purchase record? What is the purpose of such a book? Is such a book always necessary?
43. Why is a good stores system necessary for accurate cost-finding? What three classes of material may be carried in the stores? Describe the common methods of keeping store-room records.

44. Lay out a stores-ledger sheet. What are the functions of a stores-ledger?

45. How would you check the accuracy of the stores-ledger?

46. Discuss the care of indirect and special material.

47. What are so-called finished parts? When and why are they necessary? Discuss the correct methods of storing and issuing finished parts. What are purchased finished parts?

CHAPTER V

48. What is the fundamental principle underlying the issuance of material from stores so far as cost-finding is concerned?

49. Name and discuss the several methods by which requisitions for drawing material are originated.

50. Why is it impossible to install a cost-finding system in the abstract?

51. What is a production order? By whom is it originated? What information may it bear? What knowledge does the intelligent preparation of a production order require? What bearing does the production order have upon costs?

52. What are the principal sources of error in obtaining exact records of material issued? What is the principal defect in the production order method of drawing material?

53. How may it be partially obviated?

54. How is indirect material usually drawn?

55. Why is it often difficult to evaluate accurately the supplies that are withdrawn from stores? Why is the value of material in stores greater than its market value? Why is this increased value justifiable? Dis-

cuss the most logical method of caring for store-room expense. How may the varying prices of different invoices of the same kind of goods be adjusted?

56. Discuss the methods by which material in process of fabrication is evaluated?

57. What is the function of a stock-tracing ledger?

58. What justification may there be for planning of work and stock dispatching methods aside from possible reduction of unit costs?

59. Why are store-rooms for finished product almost always necessary?

60. What are the functions and uses of a stock ledger? What three records are necessary for the operation of a continuous inventory?

61. Discuss what is meant by the terms avoidable waste and unavoidable waste material. Discuss the advantages of correct material specifications. What is meant by standard material specifications or requisitions?

62. What difference will there be between the value of the material used as recorded in the general ledger accounts and as recorded in the cost accounts? Should the difference be great under proper systems of accounting?

CHAPTER VI

63. Wherein may labor values differ from material values in the cost of a given article? Why are labor values of particular importance in industries employing machinery? What reason can you give for the necessity of keeping close account of labor values?

64. What are the two fundamental principles that underlie all methods of rewarding labor?

65. Why is the day-work method of rewarding labor a natural one in primitive industry? What are the limitations of this method? What are the units of time for which pay is commonly rendered? What are the factors required in recording costs where the day-work method is used? Why is day-work better adapted to small enterprises than to large modern plants? What are its limitations?

66. What are the characteristics of the piece-rate method of payment?

67. Why are piece rates often cut repeatedly when piece work is introduced? What has been the effect of this on the general reputation of piece work? What factors are necessary in recording piece-rate costs? Why is it necessary to insure that all men work regularly even when they are paid by the piece?

68. Why have modifications and combinations of day-work and piece-work been necessary? Describe the Halsey Premium Plan. What advantages and disadvantages does it offer to the workman?

69. What is the essential difference between the Halsey Premium Plan and the methods advocated by Mr. F. W. Taylor? Describe the Taylor differential piece rate.

70. Describe the Gantt task and bonus plan of rewarding labor.

71. What are the essential elements of the Emerson plan of payment?

72. Describe the several methods in common use for checking up the time at which workmen enter and leave the factory.

73. What are the advantages of the time-clock method over other methods?

74. Describe the two general methods of collecting the detailed time that each workman expends.

75. Describe three kinds of work cards or job tickets and discuss their relative merits. Which is the most flexible and most commonly used? Lay out a work card suitable for day work, a card suitable for piece work and one suitable for premium or bonus work.

76. What is the fundamental principle in using these cards so far as accurate costs are concerned?

77. What is the first use that is made of the collected time cards? What is the second use? How may the last function be facilitated? What further use may be made of the work cards?

78. Why should a record of all lost time be kept? Of what is the total lost time a measure? How may this total be minimized?

79. Discuss the proper methods of distributing expenditures for sanitation, lighting, etc., and compare their logical distribution with so-called welfare work.

CHAPTER VII

80. What class of expenditures are included under the term factory expense? When is it necessary to classify direct material as expense? Do the several items of expense naturally attach themselves to product?

81. What kinds of expense are fairly constant regardless of the volume of the business? Name other kinds of expense that vary with the volume of business. Is there any rule by which these may be related to any fixed factor of production? Discuss the relation of profits to the volume of business as effected by expense.

82. What expenses may vary with time? How should

such expenses be handled? Why is it necessary to average certain kinds of expenses over a period of time?

88. Discuss the distribution of expense as affected by the character of operations and also as affected by the size or weight of product.

84. What is the relation between clerical labor and the size of such products as machines?

85. What are the two principal objects to be attained in classifying expenses? Why should there be a clear-cut distinction made between manufacturing and general expense?

86. Is it always possible to make an absolutely logical division of expense between the manufacturing, sales and administrative departments?

87. Discuss the allocation of interest where the manufacturer has actually borrowed money.

88. Discuss the same question in the case where the manufacturer owns his own plant.

89. Why are the same arguments applicable to insurance and rent?

90. Under what conditions may it be logical to charge up a piece of spoiled work against the production order number on which it is manufactured? What is the correct theory for charging off losses due to bad workmanship and defective material? How would you dispose of the loss due to defective purchased material?

91. What are the objections to charging lost time to particular production order numbers? Why are lost time and spoiled work a measure of efficiency in management? How should the cost of such losses be allocated?

92. What are the proper methods of distributing engineering costs when such work is performed for the sales department; when performed for contracts already

secured; when performed for standard product that is in more or less continuous production? What is a suspense account? What kind of costs are carried to suspense accounts and how are such accounts discharged?

93. How would you charge off the cost of patterns that have been made for a specific job? How would you charge off the cost of patterns that have been made for continuous production? Discuss the value of drawings. Why should the distribution of the cost of special tools be very carefully considered? How would you charge off the cost of small perishable tools and equipment? Under what conditions would you consider a large special machine a safe permanent asset?

94. Distinguish between improvements and repairs. Why should there be some limit set as to the financial value of what may be considered as improvements? Under what conditions would you consider repairs on a machine as constituting an improvement such as would raise the inventory value of the tool? What is the essential nature of repairs? Classify the repairs as found in an ordinary manufacturing plant. Under what conditions should expense charges be added to the cost of repairs?

95. Lay out a plant ledger card. Why should heavy repairs and replacements be equalized over some period of time rather than be charged against the work in progress?

CHAPTER VIII

96. Define and discuss depreciation. Define and discuss losses on revenue account and losses on capital account.

97. What forms of depreciation are included under each of the terms, wear and tear, physical decay, deferred maintenance, inadequacy, and obsolescence? In what forms of work may any and all of these be recognized and used? Under what headings are these forms of depreciation commonly classified in factory work?

98. Why cannot complete compensation for wasting losses be fully made by repairs? In what class of enterprise may repairs sometimes fully compensate for depreciation? What proof should there be that such is the case? Discuss mathematically the relation between repairs and depreciation as applied to a machine tool.

99. What is meant by a visual inventory of a plant? What are its advantages and disadvantages?

100. Name several kinds of industrial values. What three are of most use in factory accounting? Define original cost, residual value and present value.

101. Discuss by means of a mathematical example the relation between these values and the cost of repairs.

102. Define and discuss the percentage-on-original-cost method of depreciation.

103. Define and discuss the percentage-on-diminishing-value method of depreciation. Compare the relative advantages and disadvantages of the two methods.

104. In what division of the expense does depreciation belong? What are your reasons for so placing it?

105. Why is it necessary to classify the assets before setting rates of depreciation?

106. Describe the sinking-fund method of caring for depreciation. What objections are there to this method? What class of problems is the sinking-fund method applicable to? What is usually done with the amounts set aside for depreciation?

107. What are included in the term sundry expenses? In what form do these expenses usually appear? What abuse of the sundries account must be guarded against?

108. What are the two principal divisions of general expense? Under what conditions is it desirable to keep these two classes combined and when should they be separated? Can they always be clearly separated? What governs the detail into which the general expense should be divided?

CHAPTER IX

109. What are the principal reasons why cost-accounting is not, in general, absolutely accurate? Why are most cost-finding systems compromises between accuracy and simplicity? What is the basic principle of practically all cost systems in common use? What are the tangible factors of productive costs?

110. Describe the method of distributing expense by the method of percentage on material cost. Give a numerical example illustrating this method.

111. In what class of industries is the percentage-on-material method often sufficiently accurate? Why is this so? Why does it not apply in more complex industries? Why is the error in this system very great where material of greatly varying value is used in the product?

112. Describe the method of distributing expense by the method of percentage on labor cost. Give a numerical example illustrating this method. Why would you expect a different result by this method from that obtained by using the method of percentage-on-material using the same data?

113. In what classes of industry is the percentage-on-labor method applicable without great error? Why is

it more extensively used than any other method? Discuss its limitations and errors considering workmen of varying speed. Discuss its limitations and errors where there is a difference in the size and weight of the product. Compare the expense charge under this method considering work done on an expensive automatic machine and the same labor charge on a piece of hand work. Why may departmentization of the right kind make this method of expense distribution accurately applicable?

114. What are the essential features of the plan of distributing expense using the prime cost as a basis? Illustrate the method by a numerical example.

115. What are the general limitations and errors in this last method of distributing expense? What particular error will there be in using it in a factory making a varied product? Why does it fail in mixed manufacturing, particularly when applied to a job, the cost of which is made up largely of material costs?

116. What are the essential features of the method of distributing expense by the method of percentage on man-hours? Illustrate this by a numerical example.

117. Under what circumstances will this method give the same results as the percentage-on-wages plan? What advantage has this method over the preceding methods so far as recognizing the value of time is concerned? What expenses are more strictly proportional to time than to wages? What is the greatest defect of this method of distributing expense? To what kind of enterprises may it be applied without serious error?

118. What common defect is inherent in all the methods of expense distribution heretofore discussed? To what class of enterprise only may they be applied, therefore, without serious error? Discuss the reasons

why many expenses do not naturally attach themselves to wages or material but gather more naturally around machines and processes. Why are accurate methods of expense distribution often of great relative importance compared to the correct allocation of direct wages? To what factors of production do rent, insurance, taxes and interest naturally connect themselves?

119. What was the probable origin of the machine rate? What did it originally attempt to do? Describe its features as used originally. What are the principal features of the machine-rate method that most strongly justify its use? What is the greatest difficulty in setting an intelligent machine rate? What are the fundamental requirements in order that the machine rate may distribute the expense accurately? Why are these conditions difficult to obtain in practice?

120. What advantageous feature does the machine rate possess that the other methods of expense distribution do not?

121. What is meant by a supplementary rate? How is it calculated? Why cannot the value of the supplementary rate ever be zero? What changes in the production would be reflected in the rise and fall of the supplementary rate?

CHAPTER X

122. What is meant by a production center?

123. Discuss the characteristics of this form of cost-finding organization by comparing the production center to small independent shops.

124. Why do these ideal general conditions suffer no change because of the production centers being all

housed in one building? Discuss the several functions which the manufacturer may exercise. What basic difference is there in the method of classifying expense under the machine rate and supplementary rate compared to other methods?

125. What is meant by the term production factor? Name the logical production factors of a manufacturing business. What is the first step in finding production factors?

126-132. Discuss the methods by which you would evaluate the several production factors.

133. What class of expenses go to make up the individual factor or the factor that is connected only with each production center? Can this factor be computed more readily or less readily than the factors already discussed?

134. What is a controlling account? Describe the manner of its operation. What auxiliary service may these accounts render?

135. Why must the computation of production factors be made in some systematic manner? Lay out a simple form for accomplishing this. Lay out a table similar to Figure 18 assuming other data. What advantages are there in equalizing the final rates and arranging them in a few classes?

136. What are the principal defects and disadvantages of the machine rate and supplementary rate method? What inherent sources of error does it possess in common with all other methods? Discuss the advantages and disadvantages of the penalizing effect of the machine rate on work done on a machine larger than is necessary.

CHAPTER XI

137. What are the two divisions of general expense? Can they be treated always as absolutely independent of each other? Why is it difficult to allocate administrative expense to factory orders? Show by a numerical method how administrative expense is usually computed.

138. Can selling expense be allocated to shop orders? To what extent can sales and administrative expense be allocated? Why should the two branches of general expense be kept separate?

139. Summarize the reasons why exact cost-finding is difficult if not impossible. Why are different cost-finding systems justifiable? What is the essential feature of a cost-finding system? Discuss the difference between costs that represent facts and estimated costs. Why should the cost-system be as simple as possible? Why should great care be used in outlining a new system? Why are most cost-finding systems of the nature of a compromise? Why should the cost expert and the practical manufacturer be of mutual help in organizing a cost-system?

140. Summarize the advantages of departmentization from the standpoint of cost-finding. Define the two general methods of departmentization.

141. Show how departmentization on the basis of the character of the product grows naturally out of small enterprises.

142. Why is departmentization by the process-to-be-performed in line with modern ideas of organization? Why is it applicable particularly to mass production? Show how both methods may be used to advantage in certain kinds of plants.

CHAPTER XII

143. What are the three important functions of cost records?

144. Why are cost records not always serviceable for setting selling prices? Discuss the information needed to predict costs in advance of construction.

145. Discuss actual costs and so-called estimated costs.

146. Discuss the character of cost records for showing how money has been expended.

147. Summarize the sources of cost data and the general methods of securing the same.

148. Give the reasons and conditions that may make a cost ledger necessary. What are the functions of a cost ledger? Lay out a sample page of a cost ledger.

149. Describe a labor-cost card and a material-summary card and tell why and when they may and may not be necessary.

150. What is the first step in assembling costs from the job cards? What is the second step?

151. Discuss the routine work of posting up the job cards on the labor-cost sheet.

152. How is the material posted on a material-summary sheet?

153. How is it finally summarized on the cost ledger sheet? When may it be necessary to use several cost-sheets and one grand summary cost-sheet? Illustrate this by making out a set of cost-ledger cards for a steam engine. What general defect is there in the use of the cost-ledger cards? Make a cost card showing the cost of different lots of parts comparatively.

154. Why is this a valuable way of recording costs?

155. Describe and discuss the method of filing costs by classes.

156-157. Show how these general methods may be modified to suit the conditions found in continuous manufacturing.

158. Why is the problem of cost-finding in continuous industries complicated by having much material of high value always in process?

159. Discuss the need of an index for a cost system. Describe two methods by which this is often accomplished. Discuss the limitations of each method.

160. What are the considerations of an enterprise that enter into the formation of the general accounts? Wherein do these considerations differ from those that govern the cost accounts? Show that so far as total profits are concerned, detail cost accounts may not be necessary. Discuss the formation of a trading account and the items that enter into it. Summarize the reasons why the cost accounts need not necessarily be closely related to the general accounts. Why is it desirable that a close relation should exist? Discuss the formation of controlling accounts and the manner in which some of them may be fed from the cost accounts. Why are the general accounts likely to be more accurate than the cost accounts? What items in both sets of accounts should agree and what is the most likely source of disagreement between the two sets of accounts?

CHAPTER XIII

161. Why is it necessary to summarize cost data into concise form, especially in large enterprises? What tendencies do the general accounts indicate?

162. Why are the statements found in the general

accounts not sufficient for all purposes of management?

168. What is the general nature of a manufacturing report? Name an important report that comes naturally from the general accounts.

164. What information would you expect to find on a salesman's report? Discuss the monthly statement and identify the items contained therein that must, in general, be obtained from the cost accounts.

165. Describe the labor report and show the basis of its formation.

166. Show why the ratio of direct to indirect labor is not necessarily a criterion of efficiency.

167. Lay out an expense analysis sheet for some simple industry. Describe the progress report.

169. What general principle in the form of reports adds greatly to their value?

170. Show how comparison always assists in making statistical data more valuable. Discuss the value of expressing statistical data as a ratio. Discuss the value of standards of performance. Why are graphical methods particularly valuable in statistical work? Make a graphical statement of the expense analysis assumed in connection with Art. 65. Discuss the value of committees in general.

171. Why is it impossible to lay out any one cost-finding system that will be universally applicable? Why should a cost-finding system be carefully planned by some one well informed regarding the details of the enterprise? Name some of the difficulties to be met with in installing a cost-finding system.

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